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October 11, 1919

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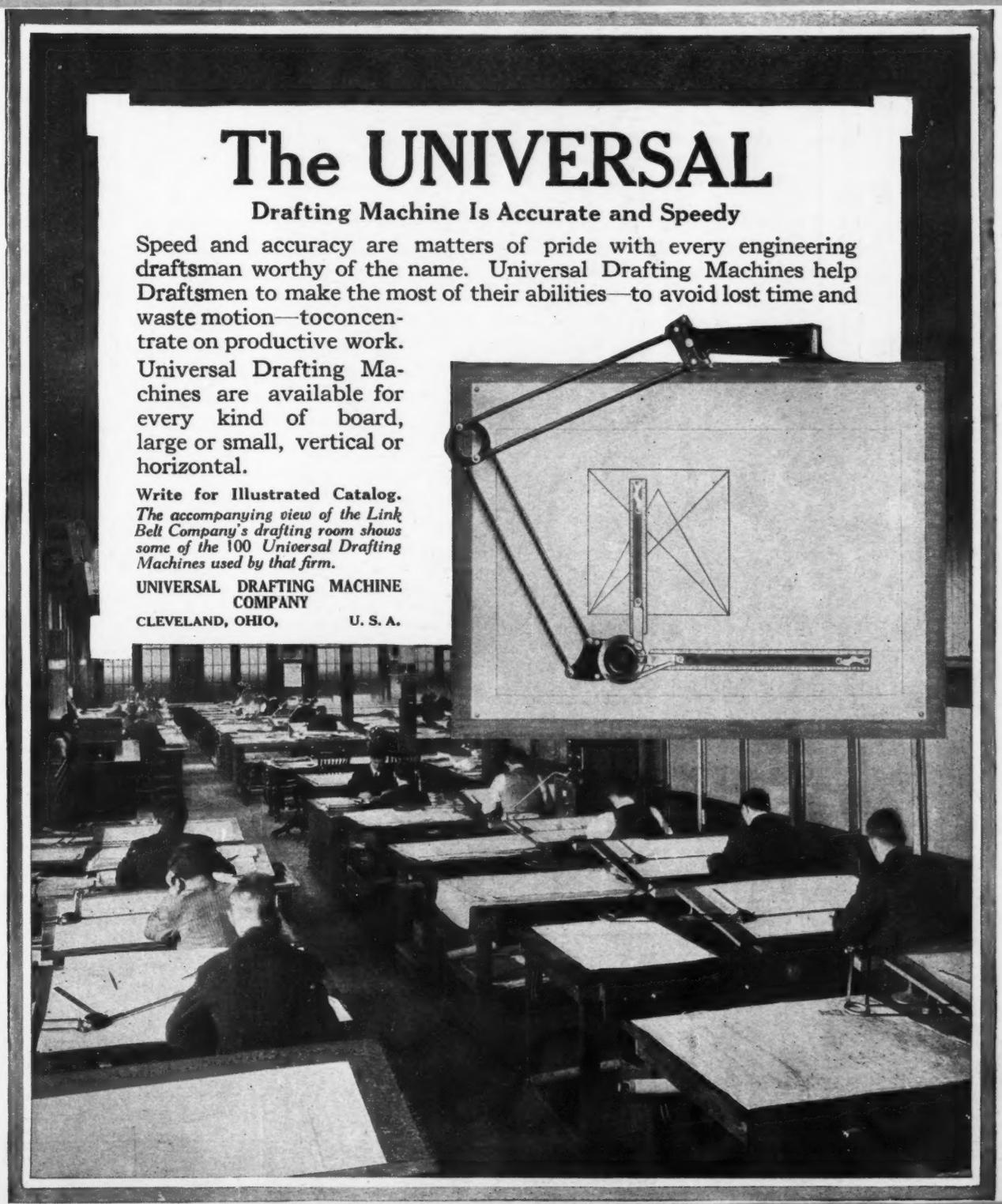

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Engineering and Mining Journal

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Volume 108 — New York and San Francisco, October 11, 1919 — Number 15

Salutatory

THE accession to office of the new editor, and his assumption of the editorial "we," came at a singularly inauspicious time, being signalized by a presumably purely coincidental printers' strike and the suspension of the Engineering and Mining Journal for the first time in its history. The assumption of the coincidental nature of the strike is strengthened by the fact that about two hundred other New York periodicals similarly suspended.

The strike which caused this hiatus is of unusual interest in that it represents a contest between organized labor, as commonly so understood and represented by the American Federation of Labor, and certain local unions, which are characterized as "outlaw" unions, and whose demands for shorter hours and larger pay at this time have been denounced by the American Federation as springing from a radical, un-American, and Bolshevist program.

Whatever may be the ultimate explanation of the particular disturbance which has upset the periodical publishing industry of New York, there may well be more coherence and significance in the present widespread strike disease than is proclaimed from the housetops, and in the signs that strikes emanate from propaganda foreign and opposed to the more intelligent policy of organized American labor, which proved its patriotism and its enmity to revolutionary doctrines during the war. The existence of such propaganda indicates a guiding central organization, concerning which we have no adequate information, and which, therefore, is secret. The existence in the United States of such an organization, devoted to the overthrow of existing society and government, is known in a general way from various evidence and bits of testimony; as is also the fact that the real headquarters of this movement are not in the United States but in Europe. Russia is the source whence the missionaries of these subversive doctrines and the funds for its anti-American campaign are most commonly reported to have come. On the other hand, a magazine correspondent asserts positively that the real head of the movement is a Prussian, whose headquarters are in Switzerland, of whom Lenine and Trotzky are emissaries and subordinates, and that from these Swiss headquarters campaigns of strikes and other movements for the sapping of government are directed in various parts of the world.

In this connection, one recalls with curiosity the statement of the chairman of an investigating committee of the New York Senate the other day to the effect that the present industrial strike epidemic is due to a German plot to control the world's commerce. Whether such is the basis of our present difficulty, or whether some of these unintelligent strikes are in part or in whole due to the hilarious joy-riding of the wage-earner trying to find out how far his luck will carry him, we have no means of estimating; but our judgment is that the organized radical movement will be found strongly underlying.

The Mining Engineer And the State.

IN HIS presidential address at the Chicago meeting of the American Institute of Mining and Metallurgical Engineers, Horace V. Winchell touched a high note in appealing to mining engineers not to neglect public duties in their absorption in their chosen profession. We shall publish this address soon. Meantime, we wish to second the appeal of Mr. Winchell in this regard. No body of men is more qualified to be of public service than mining engineers. Contrary, perhaps, to the common impression in the East, they are a class of men holding to an unusually rigid ethical code; they are seasoned and resourceful, and they have conspicuously the advantage of being on easy and equal terms with all classes and castes. Therefore, they are Americans in the highest sense and are qualified to serve their fellow citizens and the common weal better than most other classes of men.

It is in a way unfortunate that the conservatism of the engineer, which is a natural accompaniment of his experience and insight, should have kept him so largely aloof from public affairs and from active interest in public questions. The war tended to call the mining engineer from this seclusion and brought him to the fore, where he served with success, not only in the Army but in many other responsible emergency positions, where his special training and acquired initiative were of value.

The present days are hardly less grave and important. The violent and vociferous minority which is campaigning to smash the Constitution and substitute for the ideals of democracy the oligarchic yoke of the bigot, can only be successfully subordinated and relegated to its proper proportions by a live interest and activity in public affairs and all questions of the day by such men as the mining engineers and others of like type.

It is a duty no less imperative at the present day than that which the mining engineer owes to his family, to serve the democratic state actively and sternly, and not contribute by impassivity to the rule of an ignorant minority.

The cultivation of honest politics as a national sport would solve most of our problems. We have a larger fund of intelligence and common sense than other nations, and the problem is to get it into action.

The Neglect of the Non-Metallic Minerals

THE non-metallic minerals have been considered as of minor importance in the mining industry. With the exception of such substances as phosphate rock, limestone, dolomite, and recently magnesite, attention has been concentrated largely upon the metallic minerals.

In recent times we have seen the development of the alloy steels, with the resulting benefit to the structural engineer, in the manufacture of the high-speed engine and tool steels. Tungsten in illumination, radium in medicine, Monel metal where tensile strength and non-corrosive qualities are required, antimony in type metal and shrapnel lead, arsenic in agriculture, the copper-tin-lead-antimony alloys for anti-friction metal, alloys of nickel and chromium as resistance substances in electrical work all have been developed by the persistent effort of tecnologists, mostly within the last two decades. The use of zinc as roofing material and for electrical fixtures, as well as for many other purposes, is being advocated by the American Zinc Institute. Recent efforts have been made to introduce the use of lead in galvanizing as a substitute for zinc.

The utilization of products of non-metallic minerals has not kept apace with their associates in the mining field. This may be because the latter have offered a greater promise of success to the investigator and inventor.

Just what possibilities lie within the realm of the non-metallic mineral industry, no one would be justified in attempting to predict. As there is comparatively little present use for many minerals of this class, deposits remain undeveloped, and where these occur with other minerals, at present more valuable, they are usually rejected as waste. Imports of pottery are being made in large quantities into this country when it is entirely probable that some domestic clay deposits could be further utilized.

About 20,000 tons of strontium hydrate manufactured from celestite was reported to have been used in Germany for the extraction of sugar in the beet-sugar industry in one year, and barium compounds have also been put to a like use. The manufacture of barium salts was almost entirely confined to Germany before the war. Since the German-owned patents have become available to enterprising American manufacturers, there has resulted the development of the extensive American deposits on what promises to be a large scale. Our sulphur production under normal operations far exceeds the demand. Is it certain that none other than the present uses can be found for this important mineral?

Sufficient research work should be conducted by Government agencies, scientific bodies and by private enterprise to discover further the utility of the non-metallic minerals. The committee on Non-Metallic Minerals of the American Institute of Mining and Metallurgical Engineers has undertaken to further this purpose by the collection and dissemination of information among possible producers and consumers. State geologists and individuals with opportunities of knowing the resources of certain localities can co-operate by contributions to the general literature on this subject.

Do You Appreciate the Value of the Scrap Heap?

DURING the war, mining and metallurgical managers operated their plants for the most part at maximum capacity. Considerable new equipment was installed, but in many cases repairs were deferred. To shut down a machine for the time which would be required for repairs was thought inadvisable, and then, too, the idea was current that prices were very high only temporarily, and that work not absolutely necessary could better be postponed until supplies were more plentiful.

The time of stress is passed. Most mining works are now operating at a fraction of their capacity, so that needed repairs and replacements can easily be made without sacrificing production. Economists believe that a new price level has been established, which will not be materially reduced for several years; in fact, in many cases, prices are still advancing, so that purchases should not be deferred in the belief that more advantageous terms may be made in the near future.

Soon, we hope, the treaty of peace will be signed, and credits will be established between nations. Mining, one of the most basic of all industries, may be expected to be one of the first to be called upon to rebuild Europe. The mining industry should be ready with its machinery in the most efficient condition. Too often, when business is good, the tendency is to say "We have no time for changes," and when business is bad, "Times are hard, and we cannot afford to spend the money."

The economy of labor, at its present high price, is something to which we must all give attention. Nothing is so wasteful in this respect as a decrepit machine, and it belongs on the scrap pile. Former well-reasoned decisions must be revised, for a machine which was economical five years ago may not be so today, though, in itself, it may be just as efficient.

Some years ago, when mottoes were more popular as an office decoration than they are today, the writer had one on his desk reading somewhat as follows: "The principal reason for the success of the American business man is that he appreciates the value of the scrap heap." The manager of the plant, which was in none too prosperous a condition, was a parsimonious individual, and, spying the motto one day, said "Yes, that is very true; lots of material is thrown on the scrap heap which might be made to serve a little longer." Thus we have the other point of view. But it is not the big way to look at things—what we like to think of as part of the American Idea. Pennies saved do not always grow to be dollars in the bank.

Too Much Regulation

SENATE Bill No. 2896, introduced by Senator Nelson on August 23, 1919, provides for Federal regulation of the manufacture, sale, purchase and use of explosives. It follows closely the line of the U. S. Explosives Act, the salient features of which were published in the Journal of February 22, 1918, p. 378. The Explosives Act was designed to cover the conditions growing out of the war. The proposed Federal regulation is objected to by mining and other interests in California for the following reasons:

First, it places an additional unnecessary burden upon mine operators.

Second, it will supersede an already workable and practicable State statute now in force in California, which, together with certain rules and regulations adopted by the Industrial Accident Commission of the State of California, provides for the manufacture, sale, use, and storage of explosives.

Third, the revenue provided for therein would be entirely inadequate to meet the cost of enforcement.

In an editorial appearing in the Journal on June 21, p. 1098, there was pointed out the need of close control upon the distribution and use of explosives, and the question was raised as to whether it would not be good public policy to have uniform state or Federal laws to cover this need. Under our system of government, the control of explosives used within a state is vested in the state government. It is a part of the state police powers, as well as a part of the activities of State Industrial Accident Commissions or other state organizations concerned with the safe operation of mines.

There are already adequate Federal laws regulative of the interstate transportation of explosives. We believe that a general Federal enactment of the kind proposed, however desirable it may appear to be from the standpoint of public safety, would lead to confusion, and that if it were not efficiently carried out it would be ineffective. Placing such an act in the hands of the Commissioner of Internal Revenue and his department does not denote a comprehensive understanding of the mining industry and the peculiar conditions which prevail in different states.

It is to the interests of the mining industry of the separate states to secure legislation through their respective state legislatures to cover the need for close control, without imposing excessive and irksome restrictions. It is probable that there are already state laws, as in the case of California, which meet the situation.

Wasting Heat on the Slag Dump

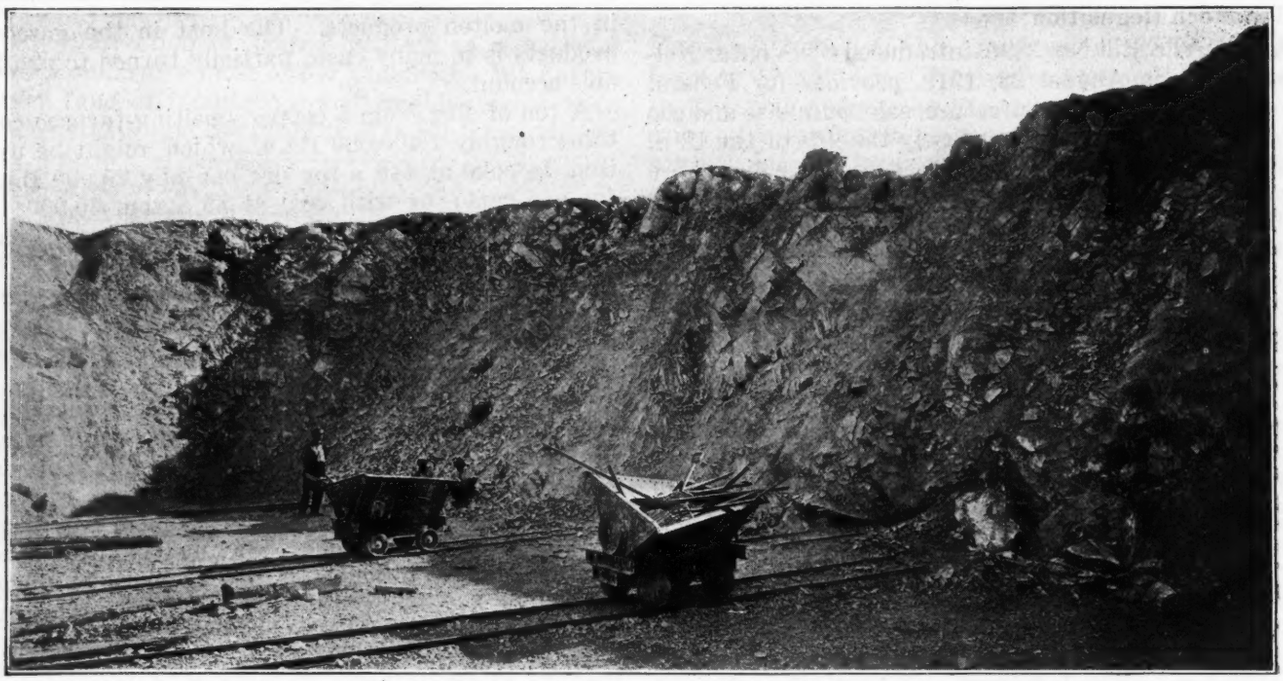
IN THESE days of conservation, the sight of hundreds of tons of red-hot slag being poured out on smeltery dumps arouses in the thoughtful observer a feeling of regret, the extent of which depends, to a considerable extent, on the amount of his domestic fuel bill. Great advances have been made in metallurgy, but too little attention appears to have been devoted to the heat balance of metallurgical furnaces, more particularly in the utilization of the heat in the molten products. The heat in the gaseous products is in many cases partially turned to profitable account.

A ton of slag from a copper smelting-furnace contains roughly 1,400,000 B.t.u., which might be utilized. In coke at $10 a ton one can buy 25,000 B.t.u. for one cent; or with coal at $5 a ton, 50,000; or with oil at $2.50 a barrel, 20,000. Each ton of slag poured on the dump thus represents a loss of 30 to 70 cents in its heat content alone; in a plant where 3,000 tons of slag is poured every day, the yearly loss is in the neighborhood of half a million dollars. The magnitude of the loss is appalling.

Metallurgists are inclined to confine research to those problems which apparently offer the greatest probabilities for a successful solution. Yet the work may result in a saving of only $100 a day, whereas twice as much work on a harder problem may mean a reward of $500 a day. Saving the heat from molten furnace products is one of those problems which we are likely to postpone until some less visionary ideas have been developed. Yet, we do not wish to give the impression that schemes have not been devised for this purpose. The proposal has been made to run the slag into molds placed on trucks, which are drawn through a tunnel. Air passing through the tunnel in the opposite direction becomes heated and may be used for various purposes, such as under boiler fireboxes, for heating blast, and similar operations. A patent has been used on a method of running the molten slag into vertical tubes, surrounded by water, the lower part being made larger to facilitate the removal of the solidified pillar of slag. Or the molten slag might be run into a closed vessel of water, the steam removed at atmospheric pressure and used in a low-pressure turbine, the granulated slag being removed from the bottom of the vessel by suitable means.

Sometime in this generation, we venture to predict, the current wasteful practice will become obsolete. With so many of our smelting plants working at reduced capacity, the time is ripe for doing some practical experimenting on the subject.

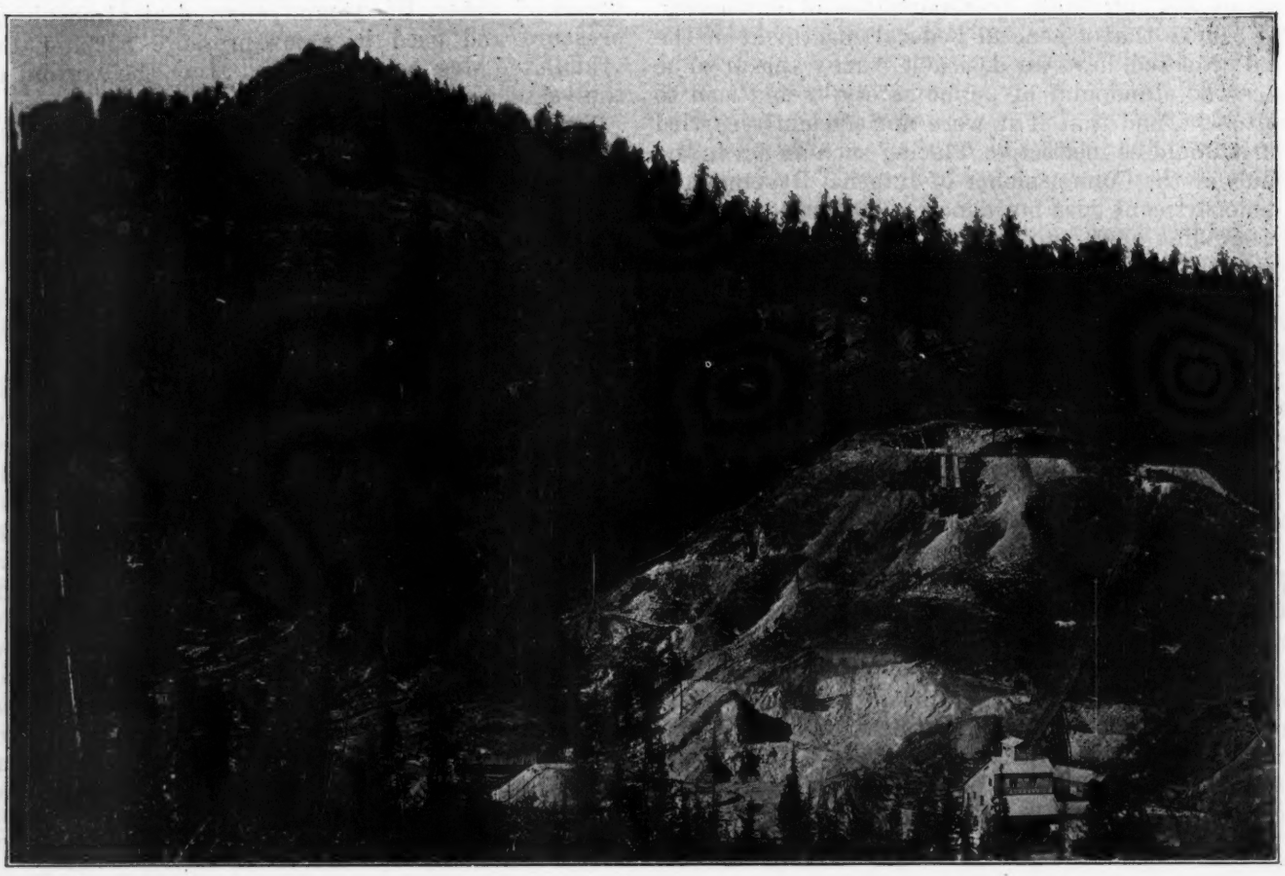
The enforcement of the Federal Explosive Act, repealed since the armistice, imposed restrictions which, though irksome, were faithfully observed by the mining industry. An important and perhaps unlooked-for result of these regulations was to diminish the liability to accident by carelessness in leaving powder lying loose along walls or upon timbers or by capped fuse left hanging on nails or on timbers. Surplus powder and supplies were returned to magazines, with the further result that a distinct economy in the use of explosives followed. Mine managers and superintendents should continue the close control of explosives in their mining operations, for, once a good practice has been started, it can be continued; but slackness and carelessness, if allowed to follow at the heels of a strict regime, inevitably result in danger to all underground men, as well as waste, both of which conditions add to the cost of operations.



FACE OF QUARRY AT PROPERTY OF NORTHWEST MAGNESITE CO., CHEWELAH, WASH.

Magnesite Mining in Washington

VIEW OF WORKINGS AND PLANT OF NORTHWEST MAGNESITE CO., CHEWELAH, WASH.



Ore Deposits of Utah*—Part I.

Principal Mining Districts of the State Are Associated With Occurrences of Intrusive Rocks, The Orebodies Occurring as Replacement Deposits in Fissures—Metal Production Shows Increasing Output From Lode Mines Since 1870

BY B. S. BUTLER
U. S. Geological Survey, Washington, D. C.

THE object sought in this paper is the presentation in a summary form of some of the features of the ore deposits of Utah that are discussed in greater detail in a report now in press on the "Ore Deposits of Utah," U. S. Geological Survey Professional Paper 111, by B. S. Butler, G. F. Loughlin, V. C. Heikes, and others. For a more complete account of the geology, description of individual districts, for references to the extensive literature and other features, and for detailed evidence for the conclusions here advanced, those who are especially interested are referred to that report.

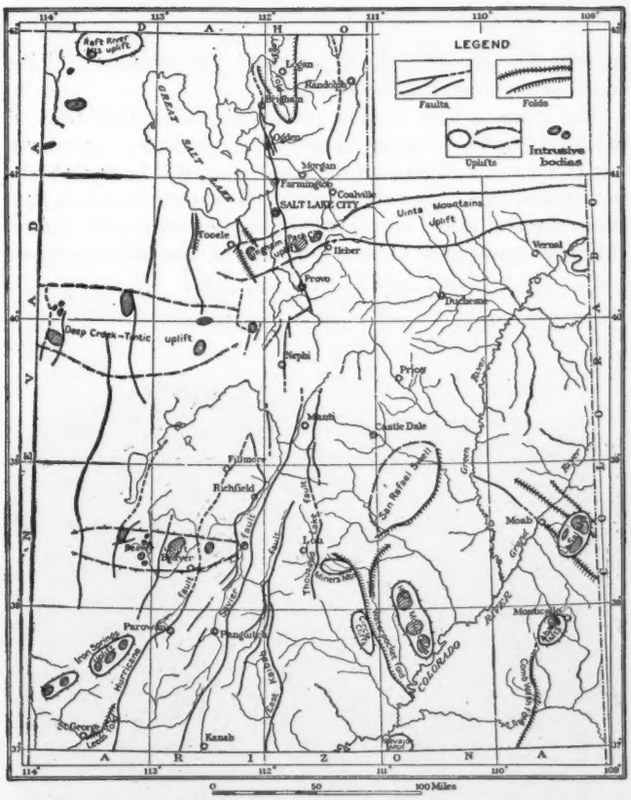


FIG. 1. OUTLINE OF THE LARGER STRUCTURAL FEATURES OF UTAH

The western part of Utah is in the Great Basin province; the southeastern part in the Plateau province; and the northeastern part includes the Uinta Mountains. The Great Basin province is separated from areas to the east by a zone that may be designated the Wasatch belt. A large part of the Basin province in Utah was above sea level and was undergoing erosion throughout the Mesozoic era, the material removed being deposited in the area now occupied by the Plateau and Uinta provinces. In post-Cretaceous time there was a general elevation of the entire region, and this was greatest along certain east-west belts forming the Uinta and Raft River ranges. Although other uplifts, such as those of Tintic-Deep Creek and of Beaver County, as shown in Fig. 1, are less prominent physiographically, they are equally important structurally.

Possibly the uplifts of the Plateau region, the Henry, Abajo, and La Salle mountains uplifts, the San Rafael Swell, and others (also shown in Fig. 1), were formed during the same post-Cretaceous period. Contemporaneous with or soon after the general uplift there was a great outpouring of lava and accompanying intrusion of igneous material over much of the Great Basin and part of the Plateau provinces, and this volcanic activity was followed by the subsidence of the Basin region below the Plateau region. At that time and later the Basin region was broken into blocks of general north-south trend, which were tilted at different angles and which form the Basin ranges. The effect of the same movement in the Plateau region was to throw the more pliable Mesozoic sediments into folds. Since these events occurred (if, indeed, they have entirely ceased), the processes most active in the Plateau provinces have been those of denudation and erosion, which have lowered the general surface and produced great canyons. As the Basin province has no outlet through which materials can be removed, debris resulting from a wearing down of the higher areas accumulates in the lower areas, and is gradually filling the intermountain lowlands. Lowering of the highlands and filling of the lowlands are both working to level the Basin area.

RELATIVE POSITION OF SEDIMENTARY ROCKS

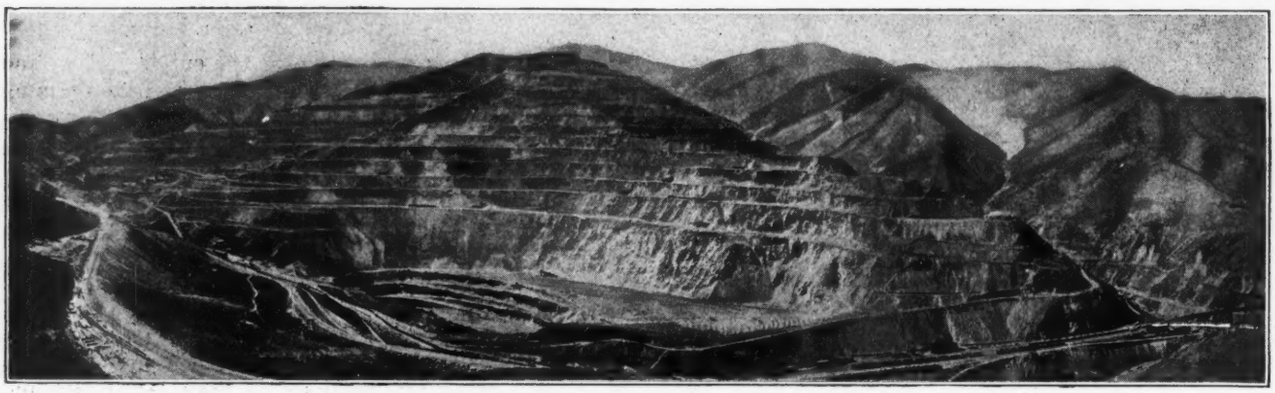
The sedimentary rocks of Utah range in age from pre-Cambrian to Recent. Pre-Cambrian rocks, mainly schist, shale, and quartzite, are exposed along the great east-west uplifts—the Uinta Mountains, Raft River Mountains, the Tintic-Deep Creek uplift, and adjacent to the great northward-trending Wasatch fault. (See Fig. 1). Resting unconformably on the pre-Cambrian rocks is a great series of Paleozoic quartzites, shales, and limestones, ranging in age from Lower Cambrian to Permian. Within the Paleozoic system there are no marked angular unconformities, but there is abundant evidence of periods of non-deposition and of erosion. The Paleozoic rocks form most of the Basin ranges and much of the Wasatch belt, but they pass eastward beneath Mesozoic formations. Near the Colorado boundary, south of the Denver & Rio Grande R.R., where the pre-Cambrian rocks are exposed, the Paleozoic formations are absent, apparently having wedged out toward the east.

Upon the Paleozoic formations lies a thick series of Mesozoic rocks, consisting mainly of shales and sandstones but including some beds of limestone. These strata are exposed principally in the eastern part of the state, but they are found also at a few places in the

*Publication sanctioned by the Director of the U. S. Geological Survey.

Great Basin. They rest with little or no angular unconformity on the Paleozoic rocks; and within the Mesozoic strata there are no pronounced angular unconformities, though in the Mesozoic era, as in the Paleozoic, there were periods of non-deposition and of erosion.

Overlying the Mesozoic rocks in large areas south of the Uinta Mountains and in the Plateau region are



MINE OF UTAH COPPER CO., BINGHAM CANYON, OQUIRRH RANGE

Tertiary formations which consist largely of sandstone and shale but include some limestone. At a few places in the Great Basin, Tertiary sediments lying unconformably on the older rocks are exposed. Quaternary sediments occupy large areas in the Great Basin between the ranges.

Extrusive rocks are of interest because of their extent, and intrusive rocks, which are not relatively abun-

LITTLE COTTONWOOD DISTRICT, SOUTH SIDE OF CANYON, SHOWING ALTA OVERTHRUST ZONE IN WHICH OCCUR OREBODIES OF THE WASATCH, COLUMBUS-REXALL, AND CARDIFF MINES

dant, because the ore deposits are commonly associated with them. Extrusive rocks are most abundant in southern Utah, where they form a broad belt extending from the Nevada line eastward to the High Plateau. They also occupy large areas farther north in the Great Basin. A large part of the lava is of intermediate composition, approaching latite, though rhyolites occur, and the latest flows are of basalt.

The intrusive rocks are confined largely to rather definite belts in the western part of the state, the more important being the Park City-Little Cottonwood-Bingham belt, the Tintic-Deep Creek belt, Beaver County belt, and the Iron Springs belt. In addition to these there are intrusions in the Grouse Creek, Raft River, and Pilot ranges and three centers of intrusion, the Henry, Abajo, and La Sal mountains, in the southeastern part of the state. (See Fig. 1.) The large intrusive bodies in the western part of Utah are characteristically stocks; those exposed by erosion in the southeastern part are laccoliths.

The composition of the intrusive rocks, like that of the extrusives, is prevailingly intermediate, approaching quartz monzonite and quartz diorite. In the stocks in the western part of the state the deeper exposed portions are the more siliceous, probably because of differentiation produced by the sinking of the ferro-magnesian minerals, which were the earliest to form, to still greater depth. In the laccoliths of the Plateau region there has been little differentiation.

The age of many of the igneous bodies is not known from direct evidence. Those that have been determined are of post-Cretaceous age. Probably most of them are of Tertiary age, though some may be earlier. Several, at least, of the intrusive bodies are later than the associated extrusive rocks.

The oldest large structural feature in the rocks is

Production of Utah Mining Districts, 1865 to 1917

District	Period	Ore (Short Tons)	Gold		Silver		Copper		Lead		Zinc Recoverable		Total Value (a)	Dividends	Number of Mines That Have Paid Dividends
			Fine Ounces	Value	Fine Ounces	Value	Pounds	Value	Pounds	Value	Pounds	Value			
Bingham (West Mountain)	1865–1917	.....	1,515,018.90	$31,318,190	48,415,824	$35,665,120	1,658,636,866	$296,608,196	1,058,092,538	$52,429,453	40,052,718	$3,678,727	$419,699,686	$88,501,870	9
Park City	1870–1917	.....	211,263.81	4,367,178	135,290,810	99,202,886	31,028,556	4,917,960	1,252,444,864	56,374,893	66,191,185	4,951,107	169,814,024	43,586,698	8
Tintic	1869–1917	.....	1,574,942.11	32,556,936	125,271,682	83,343,232	171,493,635	27,552,435	752,049,426	35,358,411	16,803,653	1,590,790	180,401,804	31,959,096	29
Beaver County	1860–1917	.....	37,139.51	767,739	21,160,906	19,588,392	49,638,383	8,478,593	411,403,954	17,980,774	33,507,519	2,577,029	49,392,527	7,747,704	4
Ophir and Rush Valley	1870–1917	.....	28,394.15	486,978	14,259,680	11,818,698	23,026,554	4,044,373	275,860,038	14,643,698	4,823,331	442,691	31,536,438	1,235,000	6
Big and Little Cottonwood	1867–1917	429,495	24,213.05	500,529	13,140,345	13,215,139	9,855,917	1,741,962	180,616,785	10,225,640	320,934	39,283	25,722,553	2,474,060	8
Camp Floyd	1871–1917	.....	920,842.87	19,035,512	(b) 48,760	57,512	.....	.....	.....	.....	.....	.....	19,093,024	3,881,323	4
Washington County	1875–1917	.....	634.14	13,110	7,356,657	8,079,416	10,609,492	1,536,775	(c) 43,669	2,315	.....	.....	9,631,616	(d) 900,000	4
American Fork	1870–1917	64,217	13,127.80	271,373	1,887,596	2,014,647	159,091	30,077	28,586,796	1,574,129	46,911	4,824	3,895,050	8,000	1
Piute County	1868–1917	485,740	150,595.75	3,113,089	704,748	490,999	(e) 73,616	14,049	(e) 847,883	61,006	.....	.....	3,679,143	439,561	1
Lucin	1870–1917	152,495	104.43	2,158	225,136	253,484	16,577,321	2,702,258	4,749,122	294,756	34,680	3,537	3,256,193	.....	..
Fish Springs	1891–1917	18,459	449.60	9,296	2,499,603	1,627,832	4,315	681	16,069,128	678,655	.....	.....	2,316,464	363,720	2
North Tintic	1902–1917	56,483	7.67	158	36,539	23,124	182	23	11,406,680	577,742	18,792,296	1,246,697	1,847,744	.....	..
Carbonate	1891–1917	4,377	912.21	18,857	102,747	63,496	2,589,245	395,655	1,328	114	.....	.....	478,122	.....	..
Mount Nebo	1870–1917	4,065	15.29	317	37,226	24,295	1,526	274	1,932,683	90,780	788,679	75,096	190,762	.....	..
Argenta	1905–1917	1,662	8.46	175	9,559	6,037	494	75	803,005	43,525	.....	.....	49,812	.....	..
Ashbrook	1899–1917	712	70.88	1,464	31,099	18,689	.....	.....	.....	.....	.....	.....	20,153	.....	..
Blue Bell	1891–1917	249	5.14	105	4,945	3,179	.....	.....	284,557	12,731	.....	.....	16,015	.....	..
Box Elder	1908–1917	151	5.25	108	189	105	23,080	3,073	7,097	496	.....	.....	3,782	.....	..
Calumet	1916–1917	684	2.00	41	850	641	78	21	290,780	22,720	.....	.....	23,423	.....	..
Clifton	1892–1917	71,576	12,199.06	252,177	163,380	134,213	1,911,840	520,791	520,721	44,622	.....	.....	951,803	.....	..
Colorado River	1911–1916	100	47.51	982	11	6	.....	.....	.....	.....	.....	.....	988	.....	..
Columbia	1908–1917	3,262	18.76	388	9,552	6,030	4,907	782	1,265,974	71,670	41,500	4,262	83,132	.....	..
Detroit (Juab and Millard Counties)	1904–1917	1,511	538.98	11,142	5,127	2,991	169,250	31,676	.....	.....	.....	.....	45,809	.....	..
Dugway	1916–1917	167	1.36	28	906	630	9,067	2,428	114,773	8,479	.....	.....	11,565	.....	..
Erickson	1916–1917	264	37.82	782	50,344	33,634	364	92	29,646	2,549	.....	.....	37,057	.....	..
Free Coinage	1917	54	.17	3	362	298	.....	.....	28,765	2,474	.....	.....	2,775	.....	..
Gold Springs	1907–1917	12,939	2,482.26	51,314	8,962	5,048	.....	.....	.....	.....	.....	.....	56,362	.....	..
Henry	1902–1916	1,607	416.96	8,619	28,332	16,104	3,056	752	96	7	.....	.....	25,482	.....	..
Imperial (Garfield County)	1914–1917	54	87.09	1,800	46	36	2,749	751	.....	.....	.....	.....	2,587	.....	..
Lake Side	1903–1917	333	.95	19	928	638	817	201	78,616	6,050	.....	.....	6,908	.....	..
La Sal—Big Indian	1907–1917	166	21.04	435	7,569	5,393	22,963	5,355	236	11	.....	.....	11,194	.....	..
Leamington	1903–1917	387	2.20	45	1,682	1,052	36	6	126,963	6,198	.....	.....	7,301	.....	..
Lost Springs	1906–1917	42	6.33	131	233	159	6,744	1,788	218	12	.....	.....	2,090	.....	..
Miners Basin	1903–1913	385	1,172.71	24,243	6,143	3,322	.....	.....	.....	.....	.....	.....	27,565	.....	..
Paradise (Cache County)	1914–1917	182	.....	.....	188	129	10,762	2,741	15,277	776	17,883	2,227	5,873	.....	..
Park Valley	1902–1917	67,755	17,945.33	370,962	8,968	5,141	49,075	6,442	21,867	1,115	.....	.....	383,660	49,000	1
Promontory	1907–1917	13,714	.....	.....	378	248	1,078	215	1,256,021	91,220	5,725,336	723,990	815,673	109,000	1
Santaquin	1910–1917	470	.47	10	3,492	2,019	208	34	206,522	9,576	.....	.....	11,639	.....	..
Silver Islet	1908–1917	954	46.93	971	122,836	70,124	70,082	10,143	479,835	20,969	.....	.....	102,207	7,500	1
Silver Lake	1902–1914	50	8.10	167	2,429	1,428	12	1	37,810	1,831	.....	.....	3,427	.....	..
Smelter	1908–1917	80,623	812.40	16,793	110,515	80,042	753,925	131,445	2,218,632	166,368	4,751,909	502,309	896,957	.....	..
Spring Creek	1902–1915	6,992	2,048.05	42,337	5,587	2,951	1,327	232	5,609	263	.....	.....	45,783	.....	..
Stateline	1901–1917	13,102	3,034.42	62,726	95,676	51,638	88	12	75,000	3,075	.....	.....	117,451	.....	..
Summerville	1902–1915	169	.....	.....	725	381	166	29	8,262	340	59,075	7,325	8,075	.....	..
Third Term	1916–1917	317	.17	4	1,336	1,086	2,623	661	77,951	6,618	.....	.....	8,369	.....	..
West Tintic	1902–1917	4,180	1,197.65	24,757	35,085	21,959	10,456	1,907	1,437,322	90,395	.....	.....	139,018	.....	..
White Canyon (San Juan)	1915–1917	96	6.06	126	384	271	49,889	12,676	.....	.....	.....	.....	13,073	.....	..
Wild Cat Range	1914–1917	182	.85	17	2,340	1,247	4,382	648	11,791	554	.....	.....	2,466	.....	..

(a) Commercial values used for metals produced in each calendar year. (b) The yearly production of silver, between 1871 and 1881, was estimated to be 46,000 ounces. (See U. S. Geol. Survey Sixteenth Ann. Rept., pt. 2, p. 355, 1895.) Since that period the gold ores mined carried very little silver, and only 2,760 ounces were reported by producers whose ores yielded a total of 920,741.10 ounces of gold from 1890 to 1913, inclusive. (c) No records were preserved by producers of occasional lots of lead ore shipped from the Black Warrior and Dixie mines in the Tutsagubet district. (d) Dividends paid by operators in the Silver Reef section are known to be incomplete. A fair estimate is given by competent authorities. (e) Between 1904 and 1911 the production was 44,244 pounds of copper and 134,361 pounds of lead, as reported by producers. Prior to this period no record of production was found.

folding. The age of much of the folding in the western part of the state has not been determined, and the folding may have occurred in two or more periods. The most pronounced folding, which was accompanied by overthust faulting, took place in the Wasatch belt, near the boundary of the Basin and Plateau provinces. This folding occurred in post-Cretaceous time.

After the folding there were east-west uplifts, some of which were accompanied by intrusions. (See Fig. 1.) The Uinta and Raft River ranges represent such uplifts, and such structural features are associated with the intrusive belts farther south, as the Tintic-Deep Creek and the Beaver County uplifts. The domes or swells and the broad uplifts that characterize the Plateau region may have been formed at the same time. The youngest large structural features are north-south faults that outline the Basin ranges and that also occur in the Plateau area. (See Fig. 1).

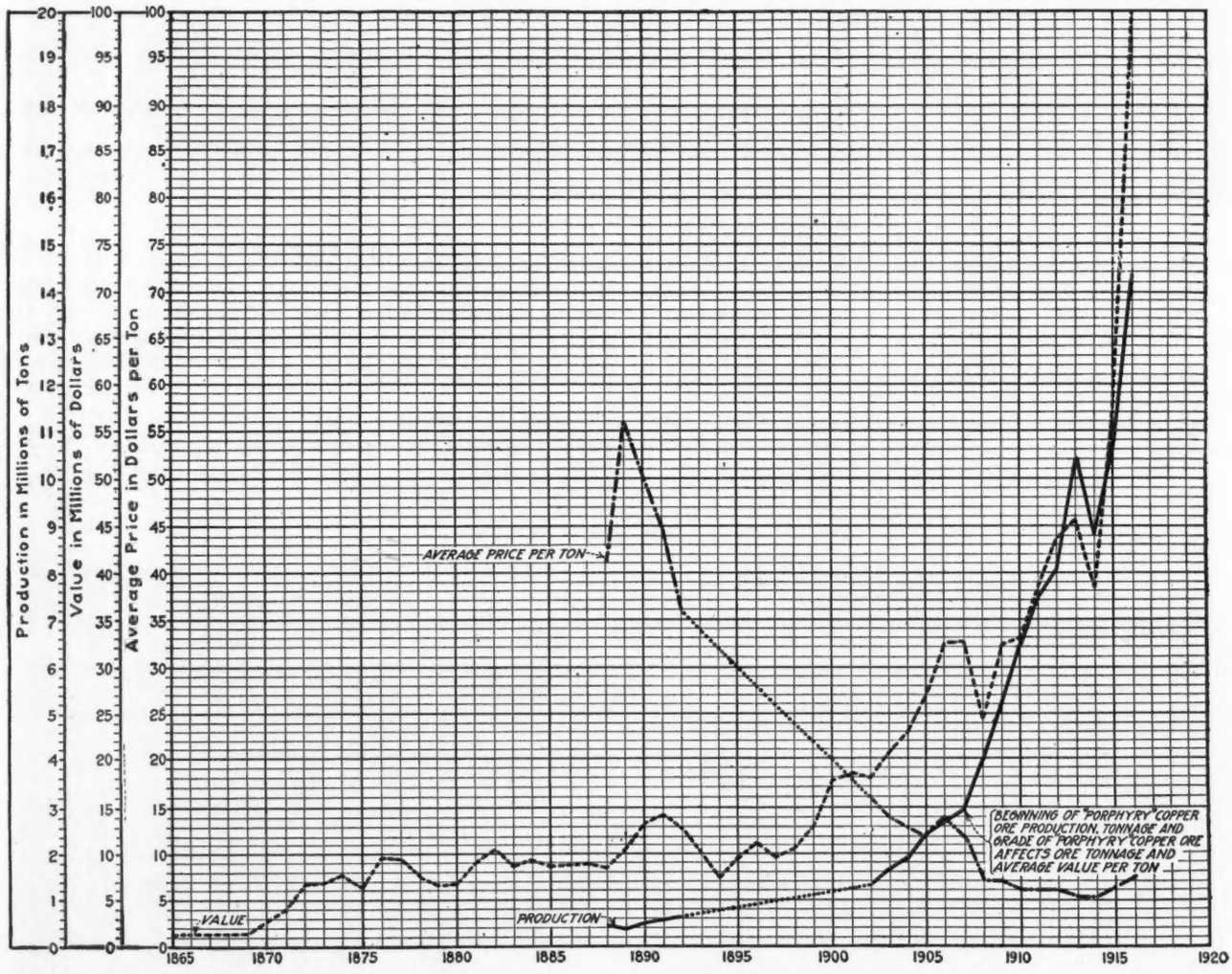


FIG. 2. CURVE SHOWING BY YEARS PRODUCTION OF ORE, VALUE OF ORE, AND AVERAGE VALUE OF ORE PER TON, 1865 TO 1916

INCREASE IN ORE OUTPUT FROM LODE MINES

The presence of metallic deposits in the mountains of Utah was known in the '50s of the last century, and a little lead ore was reduced to metal in a crude way by the Mormon settlers. Active prospecting began with the arrival of General Connor's California volunteers, in 1862, and the first claim was located in Bingham Canyon in 1863. The production of placer gold began in 1865. Since 1870, as may be seen in Fig. 2, there has been a steady and increasing output from lode mines, which to the close of 1918 have yielded a total of over $900,000,000, and the operating companies had paid dividends of more than $170,000,000. An accompanying table shows the metal production and its value for the several districts of the state.

Placer Deposits—The largest placer deposits in Utah are those of Bingham Canyon, which have yielded about $1,000,000 in gold, and there has been a small production of gold from the placers of Colorado, Green, Grand, and San Juan rivers.

Lode Deposits—The lode deposits, considered from the point of view of origin, may be separated into two groups: (1) those that show no close relation to igneous rocks, and (2) those that are closely associated with igneous rocks and are believed to be genetically related to igneous intrusion.

Deposits Not Obviously Associated With Igneous Rocks—Of the deposits not obviously associated with igneous rocks, the Mesozoic "red bed" or sandstone deposits of silver, copper, and uranium-vanadium are the most abundant. The study of certain of these deposits has led to the belief that they were formed later than most of the folds and faults which were important factors in controlling the movement of the solutions that deposited the ores. Most of the deposits are closely as-

sociated with fossil vegetation, which appears to have been a factor in precipitating the metals from solution.

The Silver Reef deposit of southern Utah, which has yielded more than $8,000,000 in silver, is the most important of this type. The orebodies are near the crest of an anticline, as shown in Fig. 3, which appears to have been a controlling factor in the circulation of solutions. The larger copper deposits of the Plateau region are clearly associated with folds, faults, and fissures. The relation of the vanadium-uranium deposits to structural features is not as clearly apparent, but their location near the domes and folds of the Plateau region seems more than accidental, and a detailed study may reveal a casual relation to these structures.

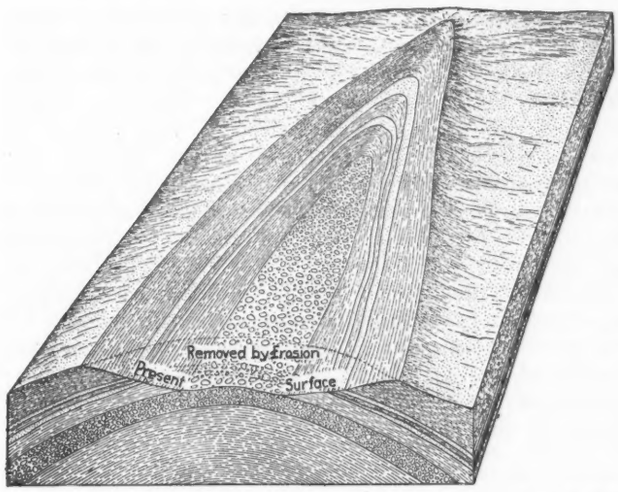


FIG. 3. GENERALIZED STEROGRAM, SHOWING THE RELATION OF ORE DEPOSITS TO STRUCTURE IN THE SILVER REEF DISTRICT

Ores are principally in the sandstone strata

The Mesozoic rocks of the Plateau region contain small amounts of metals that seem to have been deposited with the sediments, and it is believed that the workable deposits have resulted from a concentration of this disseminated metal by circulating waters after the region was elevated, folded, and faulted.

Deposits Associated With Igneous Rocks—Most of the ore deposits are associated with the belts of intrusive rocks that coincide with the Park City-Little Cottonwood-Bingham, Tintic-Deep Creek, Beaver County, and Iron Springs uplifts in the western part of the state. The deposits occur in all classes of rock—intrusive, extrusive, and sedimentary. A comparison of the different deposits in any one of the three classes of rock, and of the deposits in one class of rock with those of the others, leads to the belief that the metals contained in the ore deposits came from the same general source as the material that forms the intrusive stocks.

Deposits in Intrusive Rocks

The deposits in the intrusive rocks consist of the following: Pegmatitic gold quartz veins, represented in the Deep Creek Mountains and in the Raft River Mountains; pegmatitic quartz tourmaline-scheelite veins of the Clifton district; quartz-tourmaline iron-copper veins of the Clifton and San Francisco district; quartz-copper veins and stockworks of the Bingham and Beaver Lake districts; quartz lead-silver-copper veins of the Bingham and Tintic districts; quartz-gold veins of the Clifton district; and magnetite-hematite veins of the Iron Springs district. The pegmatitic types are unmistakably differentiation products of a magma, and the other types show such an intergradation as to lead to the belief that they are all directly related to igneous activity.

The deposits in sedimentary rocks may be subdivided into contact deposits and replacement deposits as-

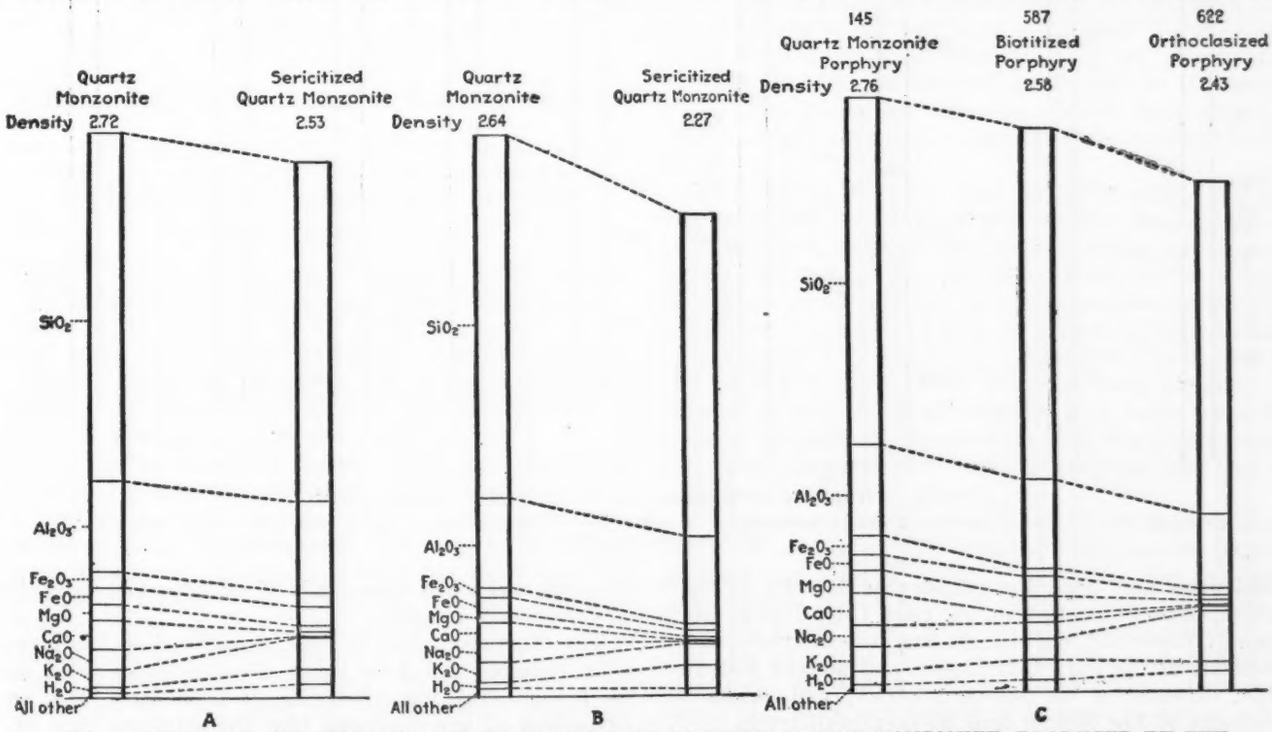


FIG. 4. DIAGRAMS SHOWING CHANGE FROM FRESH TO ALTERED QUARTZ MONZONITE, PRODUCED BY THE ACTION OF THE ORE SOLUTIONS IN THE WALL ROCK ADJACENT TO VEINS

A, Cactus mine; B, O K mine; C, Utah Copper mine

sociated with fissures. The contact deposits include copper deposits, which are present in many districts, but are particularly well developed in the Rocky, San Francisco, Little Cottonwood, and Clifton areas.

Several of the copper deposits are notably high in iron. Contact gold deposits have been worked in the Clifton district, and contact tungsten deposits are present in the Clifton region and in the Grouse Creek range. Iron deposits are important in the Iron Springs district, and many of the other deposits contain a large amount of iron. The contact deposits are characteristically replacements of limestone at or near the contact with intrusive rocks by silicates, oxides, and sulphides. All the deposits show large additions of silica and variable amounts of iron, sulphur, copper, boron, and some other metals.

Replacement Deposits in Important Districts

The replacement deposits associated with fissures include copper deposits such as those of the Bingham, Star, Little Cottonwood, Lucin, and other districts; of the replacement deposits in limestone, which are important in the Park City, Tintic, Bingham, and other districts. The deposits of the Cottonwood districts associated with thrust faults constitute a special type allied to the bed deposits.

The origin of the deposits in the sedimentary rocks can best be approached by considering their relation to the deposits in adjacent igneous rocks of the origin of which there seems little doubt. There is strong evidence that these classes of deposits were formed by similar solutions. The character of the solutions can be judged only by their action on the rocks, and it, of course, must be recognized that the same solution would act quite differently on rocks of different composition as monzonite and limestone. The similarity may be indicated by the change effected by the more abundant constituents, or it may be more strikingly evident by the presence of some of the rarer elements, but the agency of similar solutions is indicated when the proportion of the more abundant constituents is similarly shown by the action on igneous and sedimentary coun-

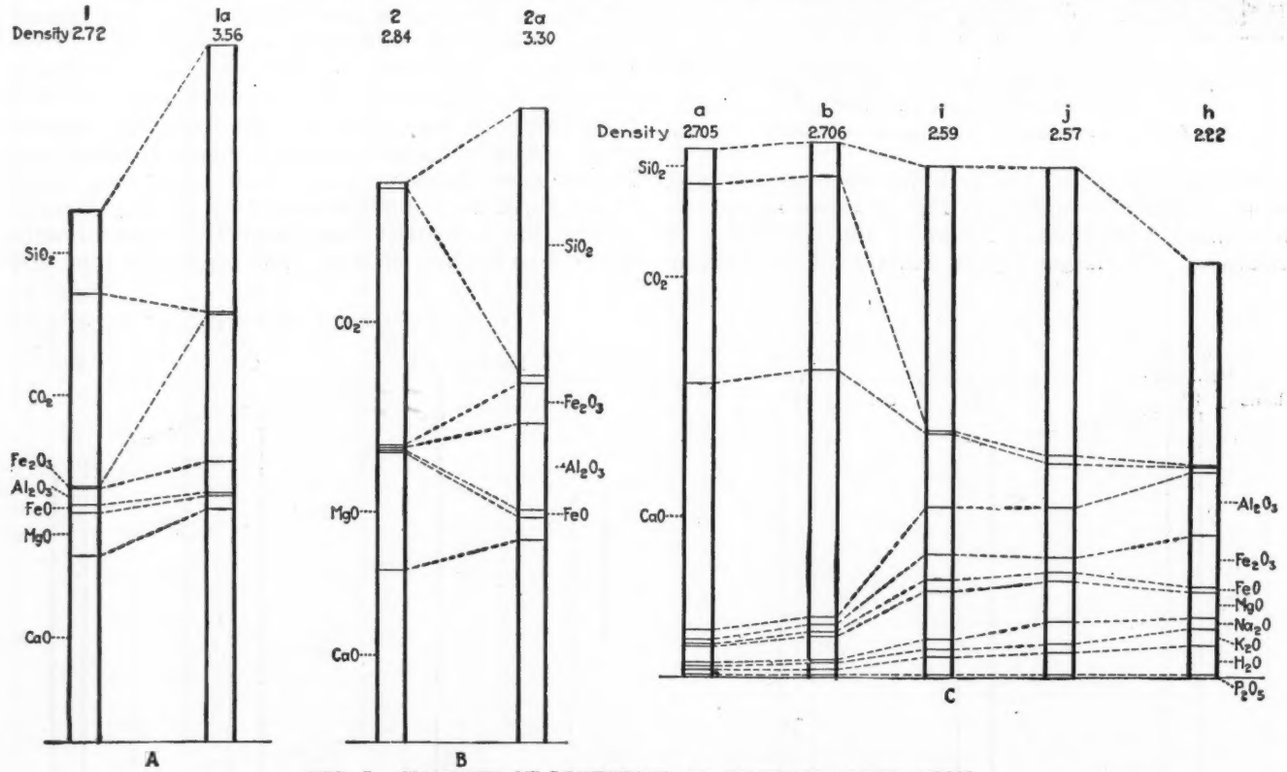


FIG. 5. CHANGES OF LIMESTONE IN CONTACT ALTERATION

A and B, San Francisco district; 1 and 2, fresh rock; 1a and 2a, altered rock; C, Iron Springs district; a and b, fresh rock; i, j, and h, altered rock

lead-silver and lead-silver-copper-zinc deposits in many areas, most productive in the Park City, Tintic, Bingham, Cottonwood, Ophir, and Stockton districts; silver deposits of the Park City, Ophir, and Mercur districts; gold deposits of the Mercur district; and quicksilver deposits of the Mercur and Marysvale districts.

The important deposits of this type may be separated into fissure replacement deposits in which the replacement has extended only a short distance from the fissure, and bed deposits in which the replacement is confined largely to certain beds or zones and may extend into them for a considerable distance from the fissure. The more important deposits of the former occupy fissures in quartzite, as in the Ontario fissure of the Park City district. The bed deposits include most

try rock and when compounds of certain rare elements are deposited in both.

The diagrams given in Figs. 4 and 5 show the principal changes that have taken place in rocks acted on by the mineralizing solutions. It is evident from an inspection of the diagrams that the solutions that effected the alteration of the monzonite were saturated or oversaturated in silica, alumina, and potassium, and were rich in iron, as there was either little reduction or an actual addition of these elements. There was a large decrease of sodium, calcium, and magnesium. The solutions that reached the limestone deposited the elements with which they were saturated, and a notable addition of silica, alumina, and iron is apparent.

The similarity of solutions is perhaps more strikingly

brought out where both types of deposits in the same district contain some of the rarer elements. Boron minerals abound, and tungsten minerals are also present in both types in the Clifton district. Abundant barite occurs in the deposits in both the intrusive and lution rich in barium, and the iron deposits of the Iron sedimentary rocks in the Tintic district, indicating so- Springs district occur both as veins in the intrusive rock and as replacement of the adjacent limestone. The location of the deposits and the composition of the solutions that formed them both point to a common origin for the deposits in the intrusive rocks and the contact deposits. Deposits in sedimentary rocks associated with fissures show all stages of mineralogical gradation from typical contact deposits, and there can be no reasonable doubt of their common origin.

Deposits in Extrusive Rocks

The occurrences of mineralization in extrusive rocks consist of silver-lead-copper-zinc deposits of the San Francisco district; gold-silver deposits of the Gold Springs-Stateline districts and the Marysvale region; and the alunite deposits of the Marysvale region. The deposits occur as filling of fissures and replacement of the adjacent rock. The situation and character of the deposits and the alteration of the adjacent rocks indicate that the origin of the deposits is the same as that of those in the igneous and sedimentary rocks, but the mineralogy shows them to have formed near the surface. The alunite deposits perhaps may have reached to the original surface.

(To be Concluded)

The Larder Lake Gold Area

Recent Developments Show More Promise Than Early Results Indicated.—Electric Power Available Will Permit Systematic Sampling Over Large Area

Toronto Correspondence

THE twenty-eighth annual report of the Ontario Bureau of Mines, 1919, Part II, contains a paper by P. E. Hopkins on the Larder Lake gold area, situated fifty miles due north of the Cobalt silver district, near the Ontario-Quebec boundary. It is connected by a wagon road seventeen miles long to Dane station, on the Temiskaming & Northern Ontario Ry.

The finding of gold in August, 1906, was followed by a rush of prospectors during the ensuing winter, when a few thousand claims were staked. Development resulted in much disappointment, and most of the claims were abandoned. Desultory mining has since been carried on at two or three properties, the total gold production being about $20,000, coming from the Associated Goldfields (Harris Maxwell) La Mine d'Or Huronia, and the Reddick property. In parts of the area, recent development work has made certain properties more promising than they formerly appeared.

The geology of the area is similar to the pre-Cambrian in many other parts of Ontario. The oldest rocks are dominantly volcanic, comprising greenstones and green schists. Associated with them are bands of of ferruginous carbonate, iron formation, slate and conglomerate, which strike nearly east and west and dip vertically. The sediments have their greatest development along the north shore of Larder Lake, portions of which are traceable westerly to Kirkland Lake. The rusty weathering carbonate is intersected by quartz and calcite stringers, which carry most of the gold. Cutting the above rocks are dikes of porphyry and aplite, and superimposed on them are erosion remnants of conglomerate, greywacke, and arkose of the Cobalt series. The diabase and gabbro dikes represent the latest igneous activity.

Rusty carbonate rocks are found in or near many of the Northern Ontario gold areas, but this type of material has been prospected to a considerable extent in various parts of the province without yielding any producing gold mines. These rocks are more widely distributed in the Larder Lake district than elsewhere, and are important, as they appear to contain a greater quantity of gold than the other rocks of the area. Gold occurs, however, in the aplite on the Gold King and in the porphyry and green schists of La Mine d'Or Huronia. It is believed that the gold is related to these aplike-porphyry intrusions and therefore indirectly to granite.

The rusty-weathering carbonates are dolomites in places which occur in bands up to 300 ft. or more in width; usually brown in color, but often large parts of them have been altered to green fuchsite or mariposite, serpentine, and talc. They are intersected by a network of quartz and calcite stringers, which carry low assays in gold over considerable widths, and frequently contain small oreshoots or spectacular gold showings. Although this association of rocks and mineral solutions is not known to form ore in many parts of the world, there is resemblance to the orebodies on the Rawhide mine, southeast of Angels Camp, Cal. Small, medium-grade oreshoots do occur, as on the 83-ft. level of the Reddick and 500-ft. level of the Associated Gold Fields, but they are isolated, with little to indicate where they will be found and what will be their extent.

The passing from ore into material altogether or nearly barren is indicated only by the disappearance of visible gold, or by low assays, and not by any change in the character of the deposit. As the known richer shoots are small and scattered, the success of mining will depend upon the working of extremely large bodies of low-grade ore, which will necessitate much capital and detailed mining. Electric power being available, a careful, systematic surface sampling of large areas of mineralized dolomite can be made at a reasonably small cost, with the purpose of finding low-grade ore over a considerable area.

The properties of the Associated Goldfields known as Block "B" and Block "D," formerly known as the Harris Maxwell and Reddick mines, respectively, are operated with electric power supplied from the company's own plant at Raven Falls, from which a transmission line was also constructed to La Mine d'Or Huronia. Mining operations have been of an intermittent character. Other gold prospects worthy of mention on which some work has been done are the Gold King, Chesterville, Kerr-Addison, and Larder Lake Proprietary. A promising pyrite prospect, which Mr. Hopkins regards as worthy of further development, occurs on Claim H. S. 904, half a mile from the southwest bay of Larder Lake, in Hearst Township. An 8-lb. sample yielded on analysis 43 per cent sulphur and 40c. of gold to the ton. Massive iron pyrites several feet wide was also seen on Claim H. S. 913, which is in the southeast part of Hearst Township.

What Mexico Needs

With Order, Fair Laws, and Honest Administration, the Latent Resources of the Country Would Be Developed Without Exploitation—A Properly Enforced Mandatory Under a League of Nations Is Proposed as a Possible Solution of Present Difficulties

BY AN AMERICAN CITIZEN RESIDING IN MEXICO*

THE editorial which appeared in the *Journal* of July 26, 1919, under the caption "Article 27" is far from accurate, and in the interest of fairness and accuracy should be corrected.

The new Mexican Constitution was signed in Queretaro, Jan. 31, 1917, and promulgated Feb. 5, 1917. Chapter I, including Articles 1 to 29, inclusive, is the Mexican Bill of Rights or, as they call it, Individual Guarantees.

"Article 14.—No law may be made retroactive to the prejudice of any person. No one may be deprived of life, liberty, property, possessions or rights, except by trial before courts, previously established, in which the essential formalities of legal procedure are complied with, in conformity with laws enacted prior to the act....."

The above is an accurate translation of part of Article 14 of the Constitution, which clearly makes any law or decree that tends to be retroactive, or any deprivation of acquired property, possessions or rights except after trial by a competent court, unconstitutional, and would undoubtedly be so construed by any just court or honest executive.

"Article 27.—Property to the lands and waters situated within the national territorial limits, corresponds originally to the Nation (has its origin in the Nation) which has had and has the right to transfer dominion to individuals, constituting (thereby) private property. This (private property) cannot be expropriated except for reasons of public utility and under indemnization.

"The Nation will have the right, at all times, to impose the regulations upon the use of private property which the public interest demands, such as regulating the use of the natural elements that may be produced; to make an equitable distribution of the public riches; and to guard their conservation. With this object the necessary measures will be taken for the division of the great estates; for the development of small properties; for the creation of new agricultural communities with the indispensable waters and lands; for the development of agriculture generally and to prevent destruction of the natural elements and the damages which property might suffer, to the prejudice of the public.

"Towns, villages and communities lacking lands and waters, or who do not have sufficient quantities to provide the necessities of the population, have the right that they be granted them, from the surrounding properties, always respecting the small property.

"In view of this, the grants of lands which have been made to date in conformity with the Decree of Jan. 6, 1915, are hereby confirmed.

"The acquirement of private properties necessary to carry out the objects expressed in the foregoing will be considered as of public utility.

"The Nation has direct dominion over the minerals and substances which in veins, masses or orebodies form deposits of a nature distinct from the earth itself, such as the minerals from which industrial metals and metalloids are extracted; deposits of precious stones; rock salt and the deposits of salt formed directly from sea waters; the products derived from the decomposition of rocks when their exploitation requires underground workings; phosphates which can be utilized as fertilizers; solid mineral combustibles (coal); petroleum and all the solid, liquid or gaseous hydrocarbons.

"The Nation is also proprietor of the waters of the seas within the limits and terms fixed by International Law; of the waters of the lagoons and estuaries; or those of the interior natural lakes which are connected directly with constant flowing streams; those of the principal rivers and streams from their sources to their mouths, if they flow into the sea or cross two or more states; those of intermittent streams which cross two or more states; those of rivers, streams or canyons which form national or state boundary lines; the waters which are extracted from mines; and the beds and margins of the foregoing lakes, rivers and streams to the extent fixed by the law. Any other stream not included in the foregoing will be considered as an integral part of the private property it crosses; but the use of the waters, when such stream passes from one property to another, will be considered a public utility, and will be subject to the regulations which the States may dictate.

"In the cases to which the two preceding paragraphs refer, the dominion of the Nation is inalienable and imprescriptible, and the Federal government may only grant concessions to individuals or to civil or commercial companies organized in conformity with Mexican laws, under condition that regular works be established for the exploitation of the respective elements, and that all the requisites provided by law be complied with.

"The acquiring of dominion over lands and waters of the Nation will be governed by the following provisions:

"I.—Only Mexicans by birth or by naturalization, or Mexican corporations, have the right to acquire dominion over lands, waters and their dependencies, or to obtain concessions for the exploitation of mines, water power or mineral combustible (coal) in the Republic of Mexico. The State may concede the same right to foreigners, providing they agree before the Department of Foreign Affairs to consider themselves as Mexicans in matters relating to the property rights, and not to invoke for the same, or for that which relates to them, the protection of their Governments, under the penalty that in case they fail to keep the agreement they will lose their rights in the property acquired by virtue of the agreement, to the benefit of the Nation. Foreigners may not under any conditions acquire direct dominion over lands and waters within 100 kilometers (62.14 miles) of the frontiers nor within 50 kilometers (31.07 miles) of the coast."

"II.—Religious Societies" and "III.—Charitable Institutions" do not concern us here, and I omit the translation, as well as "V.—Bank." "VI.—Common Holdings" as of tribes, communities, etc., will also for the same reason be omitted, as well as "VII.—Other Civil Corporations."

"IV.—Commercial corporations, with stocks (or shares), may not acquire, possess or administer rural lands. Corporations of this class formed to exploit any industrial factory, mines, petroleum wells or for any other purpose not agricultural, may acquire, possess and administer lands, only to the extent that may be strictly necessary for the indicated objects of the establishments or services, which the Executive of the Union or of the States will fix in each case.

"All contracts and concessions granted by former governments since 1876 which have tended to segregate in the

*Neither the name nor the address of the writer of this article is published, for reasons which will be appreciated upon reading the translation of Art. 33.—Editor.

hands of any single individual or company lands, waters and natural riches are declared revisable and the Executive of the Nation is authorized to declare them null and void, if they imply serious detriment to the public interests.

"Chapter III., Article 33.—Foreigners are those who do not possess the qualities named in Article 30 (i.e. Mexicans by birth or naturalization). They have the same rights which the first section of Chapter I of the Constitution grants; but the Executive of the Union will have the exclusive power to force any foreigner whose presence he judges inconvenient to leave the national territory immediately and without the necessity of previous judgment.

"Foreigners may not mix in any manner in the political affairs of the country."

In making the foregoing translations, the chief concern has been to give the true meaning of the text rather than to make smooth English, and it is believed to be accurate.

It will be noted that there are direct clashes between Article 14 and Article 27, the last paragraph of the latter giving powers to the Executive which in the former are specifically delegated to competent courts.

Under the old laws gold, silver, platinum, copper, iron, cobalt, nickel, manganese, lead, mercury, tin, chromium, antimony, zinc, bismuth, sulphur, arsenic, tellurium, rock-salt and precious stones in ore veins or deposits are specifically mentioned and declared to be the property and under direct dominion of the Nation, as well as placers of gold and platinum.

The following were declared to be the exclusive property of the owner of the soil under the old law:

I.—Veins or deposits of mineral combustibles (coal) in all of their forms and varieties.

II.—Veins and deposits of bituminous matter.

III.—Veins and deposits of salts that appear on the surface.

IV.—Springs or underground flows of water, except that waters extracted from mines became the property of the mines.

V.—Surface rocks and materials of the soil and the earths, sands and clays.

VI.—Bog iron and iron float, stream tin and the ochres.

All of these, except surface rocks and the earths, sands and clays, would now appear to have been declared to be the property of or under the dominion of the Nation; and in addition the following materials that were not specifically mentioned in the law of 1909, although some of them were well known to exist in great quantities: petroleum; hydrocarbons, solid, liquid and gaseous; phosphates and salt deposited by the sea.

It appeared that while certain valuable minerals had been considered the property of or under the direct dominion of the Nation for many years and had paid extraordinary taxes both on the lands under which they lay, without acquiring any manner of title to the surface of the lands, and upon their products, other very valuable minerals of an organic base were treated in an entirely different manner. In fact, silver and gold in ores are paying nearly double the tax on their gross value that petroleum is paying at this date, according to the statements of Sub-Secretary of Industry and Commerce, Mr. Salinas; and if the miner has over 100 hectares of claims in one mining agency he pays just 3 and $\frac{6}{10}$ times as much property tax per hectare on the area in excess of one hundred hectares.

The translation of Article 27 shows that the editorial under that heading was inaccurate in the following particulars:

(a) A renouncing of citizenship is not required—only an agreement to consider oneself as a Mexican in all that relates to the special property and only to that property, and the further agreement not to invoke the protection of one's government for that property; which is not a serious thing to agree to when it is remembered that we have had no protection from our Government nor any results from any complaints we have made to it for the last eight years.

(b) The statement regarding foreign or domestic corporation ownership of lands is fairly correct as stated, and probably a good and desirable thing to do if they can find the means to do it honestly and honorably.

(c) Leaving out the word "immediate" from the sentence regarding the holding of excess land requirements, the clause is correct and should work no hardship on any legitimate enterprise.

(d) Adding the word "direct" before "ownership" and changing the latter to "dominion" the clause would state the matter correctly, except for a slight error in the distance. Under the old law there was a zone of 80 kilometers on the frontiers in which foreigners could not take up or acquire mining properties without special permission from the Executive of the Nation and renouncing their rights as foreigners.

(e) If the writer of this clause had put a period after "nation" he would have been exact; but Article 14 of the Constitution, and possibly the indemnification clause in Article 27, cover the situation.

(f) "If they imply serious detriment to the public interest" added to the clause will make it fairly well in accord with the text of the Constitution; and again Article 14 may be called into play.

Really, there is nothing seriously wrong, radical or unusual in Article 27, except that for a legal document it is in some instances rather loosely worded and subject thereby to different interpretations. When carefully written Congressional laws are passed to regulate and enforce it, and an honest and conscientious judiciary and Executive carry the laws into effect, there should be no room for cavil.

In the United States foreigners are not allowed to take up mining claims, nor homesteads, nor pre-emptions, nor any public lands until they have declared their intentions of becoming American citizens, although they can acquire private lands by purchase. Our mining and petroleum laws are generally recognized as particularly bad, but they have been in effect so long and such immense rights have been acquired under them that it is most difficult if not quite impossible to change them to a more rational basis. The tendency of our own Government to recognize Government ownership of petroleum and coal as distinct from the soil is shown in the withdrawal of great tracts of potential oil and coal lands as naval reserves and of great tracts of oil shale from entry, by department order, although possibly under color of law, and the recent proposal to lease oil lands at not less than 5 per cent royalty, which strangely is the Mexican rate.

The taxes on oil lands, according to an interview with Mr. Salinas, sub-secretary of Industry and Commerce, published in the *Universal* of Aug. 6, 1919, is five pesos ($2.50, U. S. currency) per pertenencia (2.47 acres) per annum. The tax on petroleum is 5 per cent of its value, as stated in the same interview.

The taxes on silver, gold, copper and lead in ores

smelted to bullion within the country are as follows at present quotations:

Silver and Gold

Federal tax	7 per cent on gross value
Plus Federal tax	0.5 per cent (about) on gross value in paper
Plus stamps	0.5 per cent (about) on gross value
Plus state tax	2 per cent (about) on gross value
Total	10 per cent of total silver and gold

contents, whether the metals are exported or sent to the mint in Mexico City. If sent to the mint, there are further melting, assaying, refining, and minting charges.

Copper, in bars or matte, assaying over 50 per cent copper, over 300 g. silver per ton, or over 5 g. gold per ton; at 23½c. New York electrolytic quotation.

Federal tax	5.00 per cent on gross value
Plus (for paper currency)	0.35 per cent on gross value
Plus stamps, etc.	0.35 per cent on gross value
Plus state taxes	2.00 per cent on gross value
Total	7.70 per cent on gross value

Lead

Federal tax	2.00 per cent on gross value
Plus (for paper currency)	0.15 per cent on gross value
Plus stamps, etc	0.10 per cent on gross value
Plus state tax	1.00 per cent on gross value
Total	3.25 per cent on gross value

The tax on mining lands is as follows:

Pertenencias (2.47 acres), 1 to 5, each	$6 (pesos) per annum
Pertenencias, 6 to 50, each	9 (pesos) per annum
Pertenencias, 51 to 100, each	12 (pesos) per annum
Pertenencias, 101 and over, each	18 (pesos) per annum

This graduated increasing scale is not on groups, where there was a decrease under the old laws, but on the total number of pertenencias held by one owner within the jurisdiction of one agency of the mining department of the Department of Industry.

Whether this graduated increasing scale was put in force to favor the small operator by throwing open parts of the large holdings or for the increase of revenue by an increase of the land tax, it has failed in both. Generally the parts of the larger holdings that have been released are claims held only for the purpose of protecting the holdings on the dip of the vein or from unknown faultings, so that large capital would be necessary in either event to sink to the veins outside of their reduced lines. A great many claims of doubtful value which had been held in the hopes of sale or of interesting capital in proving them have been allowed to lapse rather than pay the high taxes. Between these and other causes, it is said that but 9 per cent of the mines that were formerly paying land taxes in one state are now paying the increased tax. This statement may have been exaggerated, but was made by a Mexican official who is in a position to know.

I know personally of a great many properties that have reduced their holdings and of others that are contemplating doing so. People who would formerly have located ten or twenty to fifty pertenencias in one denouncement or location are now taking up two to six pertenencias. All of which must make for a greatly reduced income to the federal government.

The high tax on the product of the mines, assessed as it is upon the metals in the ore by assay and without any deductions for mining, smelting, refining or freight, results in a high tax on the net proceeds; and I have seen cases where the tax represented a loss in the mining operation, resulting in stopping shipments entirely.

The mining land tax, which under the decree of April 26, 1918, was graduated upon an increasing scale upon all the pertenencias (mining claim units) within any mining district of one sole owner, was changed by the decree of June 27, 1919, to increase progressively on the sum of all the mining claim units within the jurisdiction of one mining agency owned by any single individual or company.

There is a project to increase the jurisdictions of the mining agencies, still further increasing mining land taxes on those owners who have properties that may be included within any one mining agency by such an extension of jurisdiction if it should be put in effect. The decree of June 27, 1919, in some cases may have the effect of trebling the mining land tax on part of the holdings.

It should be noted that there are no Congressional laws under the new Constitution of 1917 in effect, neither as regards mines nor petroleum. The miners and oil men are working under the old law in so far as it has not been modified by executive decrees under color of law authorized by the Congressional Act of May 8, 1917, giving extraordinary powers to the Executive in finances.

The property tax on mining lands is out of all proportion to the tax on agricultural or grazing lands. To give concrete examples, a ranch (undeveloped) but said to have timber, sugar-cane land and grazing land, containing nearly 4,000 hectares, or a little less than ten thousand acres, is paying land taxes amounting to eighteen pesos per annum; while a mining property containing 162 hectares, or about 400 acres, is paying a property land tax of two thousand one hundred and fifty-one pesos per annum on its lands without having a single square foot of surface land, and indeed being obliged to pay rental for the use of such surface land as it requires for its dumps and buildings, although the owner has the legal right to acquire the surface land needed for these purposes by expropriation. It can readily be seen that it is frequently not good policy to incur the enmity of the owner of the lands by expropriation if any amicable arrangement can be made for a lease on the lands required, even if the cost is greater.

These enormous taxes, both on the property and production, have had the effect of discouraging the working of low-grade mines and of reducing the income of the government from mines. The recent high prices of silver and copper will have a tendency to equalize the effects of the decrees as far as mines of that class are concerned, but gold mining, which had already been hard hit by the high costs of supplies, fuel and freights, will be a very undesirable occupation.

While Article 27 does not appear to be very serious of itself, Article 33, defining foreigners and giving authority to the Executive to expel them at convenience without notice or judicial procedure, would appear to be a very serious abridgment of international rights which no self-respecting nation should permit.

Article 123, "Labor and Social Welfare," which has been under consideration by the Mexican Congress for several months, is another serious menace to the occupation of capital in the republic.

What Mexico needs is fair laws honestly administered for all, foreigners and natives alike, and order within the country. It is quite apparent that it has neither order, fair laws, nor honest administration now, and in these the present dictatorship of Carranza differs only from that of Diaz in that order is not maintained, and in that it is more complete and less astute.

With order, fair laws and honest administration

there is no question that the latent resources of the country would be developed without exploitation, work for its idle hands would result, and it would take its proper place in the sun.

That there is no man, faction nor party within the country capable of rejuvenating it, is patent to any impartial observer.

The only salvation of the country is the establishment of a properly enforced mandatory under the League of Nations to give them order, fair laws and honest administration until such time as they learn the basic principles of democracy. Personal contact with the people, from the richest haciendades to the poorest and most ragged peon, leads me to believe that the great majority of the people, outside of the officials and military, would gladly welcome such a solution to their difficulties.

Chemical Compounds for the Detection Of Overheated Machinery*

Their Use as a Varnish-Paint Serves as a Heat Detector For Distorted or Dirty Bearings, Giving Warnings Before Serious Damage Occurs

By H. T. Pinnock

INVESTIGATIONS have been made into the use of chemical compounds as a means of indicating the overheating of bearings and other parts of machinery. Double iodides of mercury with other metals possess the property of undergoing a reversible transition involving change of color when heated and subsequently cooled.

Two of these compounds showed superior qualities over a number of others which were comparatively slow to change and spread over so large a range of temperature as to be unsuitable for the purposes required, or the range of color was too slight to be of any practical value. The first of these was the double iodide of silver and mercury, $AgI.HgI_2$, which is a pale lemon yellow powder at ordinary temperatures, and changes to a vivid carmine color at about 90°—100° C, the change in both directions being fairly sharp. The other was the copper mercuric iodide, $Cu_2I_2.2HgI_2$, which Tonner had previously described. This substance is a vivid scarlet vermilion at ordinary temperatures and at 60° —70° C. it changes to a chocolate brown. Both these compounds are adapted for use under suitable conditions, but it was found that a mixture of the two, consisting of 85 per cent of the copper salt and 15 per cent of the silver salt, was more sensitive and gave a greater color range from vermilion to almost black, the transition being exceedingly sharp. (Other mixtures were prepared for special conditions, but the above was more generally applicable.)

The compounds may be prepared in a variety of ways; for instance, a simple method of preparing the copper salt is by well triturating in a mortar 380 grams of cuprous iodide with 910 grams of mercuric iodide, sufficient water being added to form a paste. When thoroughly mixed, the mass is dried in the water oven, and the dried mass ground to an impalpable powder. Another method is to dissolve the mercuric iodide in excess of potassium iodide solution and precipitate the double salt by the addition of copper sulphate solution. The silver salt can be prepared in a similar manner by double precipitation. Whichever method is adopted, the product should be well washed to eliminate soluble impurities, as these appear to retard the color change, as well as to affect its character.

It has been found convenient to convert them into a varnish-paint or enamel, by incorporating the powder with a colorless varnish medium that will stand moderately high temperatures without softening. A good white shellac spirit varnish such as is used on electrical machinary has been found suitable for most occasions, as this will stand a low stoving temperature, but for more elevated temperatures, a medium such as is used in the high temperature aluminum paints used for steam pipes, and which will resist temperatures up to 200° C., is excellent. About 100 grams of compound to 70 c.c. of medium will be found a mixture of suitable consistency.

A convenient method of applying this heat detector is first to paint a white circle or ring on the bearing or other place which it is desired to keep under observation, using a zinc white paint. This white circle is applied to the journal or housing of the bearing, and the detector paint is applied as a vivid red bull's-eye in the middle of this, thus forming a striking object which is visible from considerable distances. It must of course be applied to the block of metal as near as possible to the point at which the heat is likely to be generated. It is sometimes desirable to apply the paint to the shaft itself, just where it extends beyond the bearing metal, and in this case a convenient method is to apply a broad band of white paint with a narrower band of the red detector paint in the center. This red band in the center of the white one is then easily seen as the shaft rotates. In any case, after the paint is dry, it should be protected with a coat of colorless oilproof varnish, so that the surface may be occasionally wiped free from dust and dirt.

This detector has also been successfully used on a gas engine, one of the main bearings of which was frequently heating up, owing to a slightly distorted shaft, and it was possible to place good big bull's-eyes upon it, which on many occasions gave warning of impending trouble, enabling the load to be reduced before damage was done. It was also found of service on the water-jackets of large internal combustion engines to give warning of insufficient circulation of cooling water.

Many other instances occur in which this property of the double mercuric iodide compounds may be utilized to advantage; for instance, it may be used in the reverse way on air-heating towers and the like. A case in point is that of a producer-gas plant where the air supply is saturated with water vapor at about 70°—75° C. If the outside of the tower has a white circle about 3 feet in diameter painted on it, with a center about 1 foot in diameter of the detector paint, the appearance of a red color, visible all over the plant, is a sign that the saturation temperature has fallen too low and requires attention. The same applies to feed-water heaters for boiler feed water.

*Abstracted from the *Journal* of the Society of Chemical Industry, London, Mar. 15, 1919.

Western Australia Gold Production continues to decline. According to a consular report, during the six months ended June 30, 1919, the total Australian production amounted to 573,279 fine oz., of which Western Australia furnished 410,428 oz. For the corresponding period of 1918 the Australian production was 641,911 oz., Western Australia furnishing 443,983 oz.

The Boarding House—an Institution

Contentment and Length of Service Often Depend More on Good Food, Well Served, Than on the Rate of Wage

BY RAY W. ARMS

SECRETARY BAKER of the War Department is quoted as saying that a five-cent street railway fare in cities is a psychological necessity. I wish respectfully to submit that within this category also falls the dollar-a-day board at mining-camp boarding houses. No matter what difficulty the cook may encounter in securing foodstuffs, or what prices he has to pay for them, their arrangement into three meals a day must be accomplished for a dollar, or trouble is inevitable. In these days of high costs it is becoming increasingly difficult to set a table with sufficiently wholesome and palatable food at that figure, and the price asked in a great many places exceeds it, but, in spite of this, the men will always feel that a dollar is "par," and that any more than a dollar is overcharge.

Of greater importance, perhaps, than the price is the quality of the food. In mining camps, competition is not especially keen, and the workman is forced to depend upon a few places at the most. He is at the mercy of individuals who, though they are not always profiteers, are frequently careless and seek to accomplish their task in the easiest way, instead of making some effort to procure the best available. This carelessness is always a prolific source of discontent among the men, and much of the roving tendency so evident among miners, especially in the West, can be attributed directly to a desire to change boarding places.

Men in authority whose duties include the establishment of eating places for the men all too often have the mistaken idea that those accustomed to rough work can eat and enjoy anything. Nothing could be farther from the truth. The prevalence and persistence of this erroneous opinion is the cause of much grumbling among the men.

Often there are separate boarding houses for the officials, technical men, and those in the so-called "white-collar" jobs, which receive special attention and enjoy the choice eatables, the culls being sent over to the men, to their intense disgust if they are aware of the practice.

In a few instances no provision whatever is made for the men. Even though their number may be sufficient to justify the establishment of some sort of an eating place, they are left to shift for themselves, violating their digestions with canned and cold foods.

To be wholly successful in pleasing its patrons, a boarding house must serve good, clean, wholesome, palatable foods. Fancy dishes are neither necessary nor desired, but a little care and skill in the preparation of the plain dishes make an enormous difference in the results. Cleanliness is always appreciated, even among men whose work is grimy. Linen is superfluous, but a clean oil cloth or a well-scrubbed table top will serve the purpose. Also, no matter how hardened a man may become to all kinds of fare, his æsthetic sense is always offended at the sight and the feel of a greasy plate. And, besides being clean, the food must be plentiful and varied, so that differing tastes may be satisfied.

In mining camps, where pleasures are always few, the boarding house is an institution. Beyond its threshold occur a large proportion of the events which serve to break the monotony of the miner's humdrum, off-duty existence. During working hours a man's thoughts are frequently occupied with conjectures concerning the coming meal. If he is fortunate enough to have an excellent eating place his anticipation will be pleasant, and he will be serene in the thought that, however far off from the truth his guess may be, the forthcoming meal will be palatable and satisfying. If he is ill-fated in his boarding house, his guess as to the approaching meal will probably be more nearly correct, but his anticipations much less keen.

The transient miner is said by some to be the most efficient type. In his roving from Alaska to Mexico he has picked up tricks of the trade that are unknown to the locally trained. I have never seen estimates concerning the length of his stay in any one camp, but from personal experience would judge that it is about eight weeks. He may come to a certain place attracted by a minor feature of the camp life which appeals to his fancy at the time. He stays until some adverse detail, equally minute, begins to pall upon him, and finally becomes intolerable. A great many times the feature which sends him on his journey to new fields is the boarding house. He gets along fairly well for a while, but after a time the pleasure of eating is gone. Why? Well because there is too much sameness to the menu; because everything is too salty; because the cook serves prunes three times a day; because the beef is always tough; because the flies are allowed too many privileges; because of a thousand other reasons, either imagined or actually existing. In other words, carelessness with the boarding house will never hold this type of men over their allotted time.

The word luxury is purely comparative. In New York real cream in coffee is for many a necessity. In the hills it is a luxury. On the other hand, broiled lobster is considered by some New Yorkers to be a rather luxurious repast. To the miner in camp it would be a curiosity. All of which is introductory to the statement that a little care and effort on the part of the cook will enable the men to have dishes which they will consider luxuries and will relish as such. A good tender cut of meat, some fresh vegetables, even the old stuff prepared in a slightly different way, might easily take on the aspect of a banquet to the simple tastes of the boarder.

It is therefore suggested that for several reasons it would be good policy on the part of the management to improve this often neglected department and furnish the best food obtainable. This course will be a large factor in inducing men to stay longer, and it is common knowledge that good food will render a man more efficient. It is even conceivable that where men are hired by the day or hour this increased efficiency might constitute an appreciable, though subtle, item in the cost accounts.

I have in mind a certain camp where daily wages run consistently lower than elsewhere in the district, but where the board is excellent and reasonable in price. The company runs the boarding house and hires a competent cook, who is given instructions to feed the men with the best of everything. As a consequence the company sustains a slight loss at the boarding house, but this is more than balanced by the difference in wages between this particular camp and the rest of the district. **The men feel they are getting the best of the bargain, and, as a rule, are content to stay.**

The United Eastern Mill, at Oatman, Ariz.*

A Modern Plant for Treating Gold Ores by the Cyanide Process—Single-Stage Crushing, Followed by Two-Stage Grinding With Short Ball Mills in Cyanide Solution—Straight Counter-Current Decantation Used

BY WHEELER O. NORTH

THE United Eastern Mining Co.'s property is situated in the Oatman Gold Road mining district of Mohave County, Ariz. The mine and mill are about twenty-six miles southwest of Kingman, the nearest railway connection. The ore consists of a mixture of calcite and quartz, with some andesite. The mineral values, which are mainly gold, alloyed with approximately 34 per cent, by weight, of silver, are extremely fine, so that fine grinding is a most important factor in extraction. The milling process, briefly, consists of single-stage coarse crushing, two-stage ball milling in cyanide solution, followed by combined mechanical and air agitation, and by straight counter-current decantation. The Merrill zinc-dust precipitation method is used to recover the valuable constituents of the ore, and is preceded by the Crowe vacuum treatment of the solution.

The most notable features of the plant are the absence of filters, and the use of short ball mills for fine grinding. As originally designed, the capacity of the mill was to be 200 tons per day, although the grinding facilities were to be capable of handling double that amount. By adding extra agitators and thickeners and by some alterations to the grinding equipment, the daily capacity has been raised to 285 tons. This, it was hoped, might be increased to 300 tons during the warm months of the present year.

As this paper deals primarily with plant operations, those interested in the mechanical description are referred to the article by Otto Wartenweiler,[1] the designing engineer, which gives the details and costs of design and construction. The following changes have been made since that article was published:

Two special simplex Dorr classifiers have been substituted for the two duplex Callow screens and bucket elevators, which classified the Marcy discharge and returned the oversize for regrinding. Three Dorr agitators 14x24 ft. diameter, and two Dorr thickeners, one 40x 12 ft. and one 30x8 ft., have been added to the cyanide plant. A 4-in. Krogh centrifugal solution pump and a second Ingersoll-Rand compressor, 9x8 in., were also necessary additions.

FACTORS IN OPERATING COSTS

Water.—Water costs 52c. per 1,000 gal., and 210 gal., at a cost of 11c., are used per ton of ore milled.

Power—Power costs about 2½c. per kw.-hr., and 1.25 hp. is required per ton of ore milled, costing 52c., or 24 per cent of the total cost.

Labor—Labor, which is 26 per cent of the total cost, is entirely American, the wage scale being $5 for helpers, $5.50 for millmen, and $6 for solution shift foremen. The repair crew receive $4.50 and up. The total mill crew (exclusive of repair gang) of three shifts is normally fifteen men. The total labor cost, including superintendence, operation, and repairs, amounts to 56c. per ton; the average wage is $5.17 per shift; the tons milled per man on shift, 14.27; per man on repairs, 22.79; average, 8.76.

Supplies.—Supplies, which are 48.3 per cent of the milling costs, amount to $1.06 per ton milled. All supplies are hauled from Kingman over a good mountain road, at a cost of $8.50 per ton.

TABLE I. CONSUMPTION OF CHIEF ITEMS OF SUPPLIES

	Lb. per Ton of Ore Milled	Lb. per Ton of Solution Pr'cip'd.	Per Oz. Fine Gold Recovered
Sodium cyanide:			
1917	0.722	0.198	0.717
1918	0.747	0.216	0.709
Average	0.735	0.208	0.713
Zinc dust:			
1917	0.548	0.150	0.544
1918	0.388	0.113	0.368
Average	0.464	0.141	0.450
Lime:			
1917	4.150	1.140	4.121
1918	4.930	1.430	4.675
Average	4.550	1.290	4.417
5-in. chrome balls:			
1917	0.925	.....	.....
1918	0.929	.....	.....
Average	0.927	.....	.....
1½- and 2-in. chrome balls:			
1917	2.12	.....	.....
1918	2.14	.....	.....
Average	2.13	.....	.....

Table II shows the operating costs per ton of ore milled for the last two years:

TABLE II. COST OF OPERATIONS

	Operating Labor	Repair Labor	Supplies	Power	Miscellaneous	Total
1917	$0.4738	$0.0902	$1.0675	$0.4751	$0.0448	$2.1514
1918	.4664	.0834	1.0463	.5592	.0297	2.1850
Average	.4698	.0866	1.0565	.5197	.0374	2.1691

In the mine, all ore passes through grizzleys set at 10 in. The 2½-ton skips dump automatically into the 250-ton flat-bottomed coarse-ore bin, which will deliver by gravity about 180 tons. The feed is taken by a 42-in. maple-lined, link-belt pan conveyor, using 2 kw. average load, and operating at a speed of 3 ft. per min. Two per cent of waste is here picked out at a cost of 85c. per ton.

The coarse crusher, a Telsmith No. 6 primary breaker, delivers 35 tons per hour of a 2-in. product, using 10 kw. Lately, the crusher has been preceded by 1¾-in. grizzleys, thus relieving the load and materially reducing crusher repairs.

The Telsmith product is delivered by an 18-in. belt set at 20° incline, over a Merrick weightometer, to the fine-ore bin. This belt, operating at a speed of 250 ft. per min., handles up to 50 tons per hour, taking 7.6 kw. The weightometer results have proved entirely satisfactory.

TABLE III. COARSE-CRUSHING COSTS PER TON OF ORE

	Operating Labor	Repair Labor	Supplies	Power	Total
1917	$0.0211	$0.0092	$0.0170	$0.0112	$0.0585
1918	.0209	.0153	.0359	.0100	.0821
Average	.0210	.0123	.0269	.0106	.0709

In the analysis of crushing costs in Table III, the increase in the second year is due largely to repair or replacement items.

Two-stage crushing would be desirable to secure finer ball-mill feed and doubtless could be affected at an equal, or even lower, cost than here obtained.

*Excerpted from an article that was presented at the Chicago meeting of the A. I. M. E., Sept. 22-26, 1919.

[1]*Bull.* A. I. M. E., November, 1917.

A nice point of design is the relation of ore storage, particularly mine run, to the daily output. A storage of several days' ore should be provided for, as it is an important factor in the continuous and even operation of both mine and mill. This point is too often overlooked in otherwise well-designed plants for smaller-sized mines.

The fine-ore bin is a 24x24 ft. flat-bottom wood tank furnished by the Pacific Tank Co., and made of 4-in. merchantable Oregon pine. Its capacity is 500 tons. A rack-and-pinion gate feeding an 18-in. link-belt pan conveyor running at 33 in. per min., using 2 kw., delivers up to 15 tons per hour to the ball mill. The amount of feed is controlled by the opening of the bin gate. A record is kept of this opening, as measured by the number of teeth or notches on the bin-gate operating rack shown above a stationary marker at one side. These notches multiplied by the time give notch-hours, from which a known factor gives a fairly accurate estimate of the tonnage milled for each shift or for any desired period.

COARSE GRINDING

The ore, with the addition of lime, is fed to a No. 64½ Marcy mill, working in closed circuit with a simplex Dorr classifier, set on a 3-in. slope and making thirty-four strokes per minute. This mill operates at 26 r.p.m. and carries a load of 9,000 lb. of 5-in. forged chrome balls. It reduces 260 tons of —2-in. ore to —20 mesh, using 67 kw. The grinding is carried on in a 1.6-lb. per ton KCN solution containing 1 lb. per ton of protective alkali (lime). The accompanying tables IV and V give the details of the mill operations and supplies.

Control of the coarse grinding is maintained by varying the specific gravity of the pulp in the Dorr classifier, and by the bin gate.

TABLE IV. BALL-MILL DATA

	R.p.m.	Peripheral Speed of Mill, Ft. per Min.	Tons per Hour, Original Feed	Average Power Load, Kw.-Hr.	Kw.-Hr. Per Ton, Ground	Ball Load, Lb.
No. 64½ Marcy mill 2-in. feed ground to pass 20 mesh	26	490	11.00	67	6.09	9,000
Allis-Chalmers 5 x 6 peb. mills 20-mesh feed ground 82 per cent –200	28	440	3.75	48	12.80	8,000

TABLE V. TOTAL STEEL CONSUMPTION

No. 64½ Marcy Mill	Lb. per Hour, Including Scrap	Lb. per Ton, Including Scrap	Per Cent of Metal Lost as Scrap	Cost per Ton, Ore Milled
5-in. chrome-steel balls	10.58	0.925	None	$0.0544
Feed-end liners, manganese steel	0.717	0.072	32.2	.0110
Shell liners, manganese steel, step type	1.650	0.163	45.5	.0268
Discharge grates, chrome steel	0.566	0.055	48.4	.0137
Bolts, clamp bars, center liners	0.214	0.022	63.8	.0068
Total liner consumption	3.147	0.312	43.0	.0583

The discharge of the mill is maintained at about 30 per cent moisture. The normal return circuit from the classifier is about two to one of original feed.

TABLE VI. COARSE-GRINDING COSTS PER TON OF ORE

	Operating Labor	Repair Labor	Supplies	Power	Miscellaneous	Total
1917	$0.0429	$0.0140	$0.1097	$0.1183	$0.0001	$0.2850
1918	.0387	.0165	.1424	.1465	.0021	.3462
Average	.0407	.0153	.1267	.1330	.0014	.3171

Table VI shows the Marcy mill costs. As in coarse crushing, the second year's costs are increased by renewals and replacements not occurring in proportionate amount in the first year's operation. Other factors tending to increase the 1918 costs were increases in wages of 28 per cent, power 15 per cent, and supplies in some cases over 100 per cent.

Fine grinding is done in two 5x6 ft. Allis-Chalmers ball granulators. These mills carry a ball load of 8,000 lb. of 2-in. chrome steel pebs and consume 48 kw. They grind about ninety tons each from —20 mesh to 82 per cent —200 mesh, working in closed circuit with standard Model C, duplex, 54-in. Dorr classifiers, set at 2¼-in. pitch and operating at eighteen strokes per rake per minute. As this size classifier was found to be greatly overloaded for such fine separation, an 8-ft. Callow cone was installed to take the overflow of each classifier. The spigot product is returned by a Frenier pump to the classifier feed boxes. The slime overflow of the classifier was raised 4 in., which also helped materially in the classification.

The moisture content of the mill discharge is maintained at about 30 per cent, and, as in the coarse grinding, the main control is by the specific gravity of the classifier overflow.

The cones are equipped with a 1½-in. discharge pipe, 30 in. below the overflow of the cone. After considerable experimentation, this size of outlet and head for the discharge proved to be the most satisfactory. This arrangement also acts as a trap for any coarse gold, so that a considerable increase in value of mill heads can be accommodated without the necessity of cutting tonnage. The spigot product is returned to the Dorr classifier by No. 3 Abbe Frenier spiral sand pumps.

TABLE VII. FINE-GRINDING COSTS PER TON OF ORE

	Operating Labor	Repair Labor	Supplies	Power	Total
1917	$0.0553	$0.0328	$0.1862	$0.1899	$0.4642
1918	.0678	.0171	.2393	.2055	.5297
Average	.0618	.0246	.2140	.1981	.4985

It is of interest to note that comparative data in the district show that two-stage ball milling is about 15 per cent cheaper than the same work accomplished with stamps and tube mills. At the same time, indications are that single-stage ball milling shows the same supply and labor costs, but about 20 per cent greater power consumption.

TABLE VIII. TOTAL STEEL CONSUMPTION, INCLUDING SCRAP

Allis-Chalmers 5 x 6-ft. Ball Mills	Lb. per Hour	Lb. per Ton Milled	Lb. per Ton Re-ground	Per Cent Lost as Scrap	Cost per Ton Ore Milled
1¼-in. chrome balls	11.90	2.120	3.180	None	$0.1662
2-in. chrome balls	11.25	2.000	3.000	None	.1568
1¼-in. cast-iron balls	16.30	2.900	4.350	None	.1592
Feed-end chrome steel liners	0.220	0.040	0.060	52	.0072
Throat chrome steel liners	0.037	0.007	0.010	40	.0012
Shell chrome steel liners	0.630	0.115	0.173	28	.0218
Discharge grates, tool steel	0.029	0.005	0.008	40	.0014
Discharge wedges, chrome steel	0.093	0.017	0.026	41	.0031
Total liner consumption	1.009	0.184	0.277	45	.0347

AGITATION

From the fine-grinding department, the pulp flows by gravity to No. 1 Dorr thickener, arriving with a gravity of 1.12 and a dilution of 1 part of ore to 4.5 parts of solution. The thickened underflow is pumped by a duplex, Campbell & Kelly No. 4 diaphragm pump to the first of a series of seven 14x24 ft. diameter Dorr agitators, which are arranged to handle the continuous flow of pulp by gravity. The flow of pulp is 280 tons per day with a specific gravity of 1.40. The period of agitation is about sixty-two hours, after which dissolving of values is almost negligible. Agitation is effected by air, compressed to 30 lb. by two belt-driven Ingersoll-Rand compressors, Class E. R. I., size 9x8 in., using 15 kw. for each.

From the agitators the pulp flows through five 40-ft. Dorr thickeners arranged for straight counter-current work. The barren solution, 3.76 tons per ton of ore, is introduced in No. 4 thickener, and the wash water, about 0.82 tons per ton of ore, is introduced in No. 6 thickener. The flow at No. 6 thickener is split, and about one-third is sent to No. 7 thickener, a 30x8-ft. tank. The discharges of No. 6 and No. 7 thickeners flow together to the tailing pond with a moisture content of 0.82 ton of solution to 1 ton of ore.

The seven agitators, seven thickeners, and six duplex diaphragm pumps are all driven by one line shaft and consume an average of 6 kw., or just over 8 hp. The solutions are handled by direct-connected centrifugal pumps controlled by automatic float switches.

The primary thickener taking the dilute overflow of the cones, 280 tons of ore to 1,768 tons of solution, has a settling area of 4.37 sq.ft. per ton of ore, and a settling ratio of 38 cu.ft. per ton of ore. It is necessary, however, to operate this thickener with a low mud line to prevent colloidal material being drawn over into the gold tanks. About 870 tons of solution are precipitated daily, and the remainder, about 600 tons, is returned to the mill storage.

The regulation of all thickeners is maintained by varying the speed or the length of stroke of the diaphragm pumps. The mud line is determined by use of a weighted bottle, which will sink in solution but float on the mud. The maximum gravity is obtained with the highest mud line consistent with a clear overflow, other factors of alkalinity, temperature, and density of feed remaining constant. All additions of cyanide are made to No. 1 agitator, where the cyanide is built up to 2.7 lb. KCN per ton of ore.

The cyaniding costs are given in Table IX. The reduction in price of cyanide during 1918 more than offsets the adverse factors of power and labor.

TABLE IX. CYANIDING COSTS PER TON OF ORE

	Operating Labor	Repair Labor	Supplies	Power	Miscellaneous	Total
1917	$0.0972	$0.0237	$0.4575	$0.0884	.....	$0.6668
1918	.0867	.0257	.3553	.1153	$0.0018	.5848
Average	.0917	.0248	.4042	.1025	.0010	.6242

PRECIPITATION

The pregnant solution from the primary thickener flows by gravity to the No. 1 gold tank, from which it is pumped by a 2½-in. Krogh centrifugal pump through a Merrill central-sluicing clarifying filter consisting of 28 frames 3½ ft. square. This filter delivers the clear solution to the No. 2 gold tank, or steady-head tank of the Crowe vacuum-treatment system. Zinc dust is added to the solution as it leaves the vacuum-treatment system. Control of precipitation is largely mechanical and is based on experience. The shift foreman checks the rate of zinc feed by weighing a 5-min. run, which is normally about 110 gm. When a new press is cut in, 20 lb. of zinc dust is added at once and the rate of feed is increased for six hours to 220 gm. per 5 min. The solution discharged from the press during the first 15-min. run is returned to the gold tank. This is with a precipitation rate of about thirty-six tons of solution per hour.

TABLE X. PRECIPITATION COST PER TON OF ORE

	Operating Labor	Repair Labor	Supplies	Power	Total
1917	$0.0003	$0.0032	$0.1274	$0.0243	$0.1552
1918	.0002	.0024	.0946	.0178	.1150
Average	.0002	.0028	.1103	.0209	.1342

The cost of precipitation as given in Table X showed a decided reduction in 1918, due partly to the lower price of zinc dust but mainly to the use of the Crowe vacuum treatment, which effected a saving of nearly 50 per cent in the amount of dust used.

Vacuum treatment is carried out in a 4x10 ft. vacuum receiver or drum set on end, the 6-in. inlet of which is in the center of the top and 23.4 ft. above the solution level in the steady-head tank. The solution is poured down over a series of perforated trays. During this process, the occluded air is liberated and removed by the vacuum pump. The solution level in the vacuum receiver is maintained at a height of about 30 in. by a float operating a butterfly valve in the intake pipe. This float rod is fitted with an electric contact, which sounds a "Klaxon" alarm if for any reason the solution level gets dangerously low. The discharge of the vacuum receiver is from the center of the bottom. It feeds by gravity to a 7x8-in. triplex pump set so that the pump glands are 32.8 ft. below the solution level in the receiver. This keeps a slight pressure on the pump glands and prevents intake of air at that point. The zinc dust is fed to this pump, where it is mixed with vacuum-treated solution. It is then pumped to the refinery and the 32-frame, 36-in., Merrill presses. The barren solution from the presses is returned to the No. 4 thickener, part of it being used as cooling water for the air compressors on the way back.

CLARIFICATION

The clarifying filter is dressed with No. 10 duck. One set of cloths lasts about six weeks. The feed pressure on this filter varies from 8 lb. with a clean press, up to 33 lb. just before sluicing. The press is normally sluiced every six hours, using barren solution under 50 lb. pressure. It is very essential that the sluicing bar and nozzles be maintained at a high state of efficiency; a spare bar is always kept in readiness. The cloths become coated with a lime and alumina deposit, so that acid treatment is necessary every three days.

A hot solution of 0.9 per cent HCl is used with a contact of 60 min., the acid being circulated through the press by a 1½-in. centrifugal pump. After treatment, the press and acid-circulating system are drained and washed out, and the acid solution is stored, for future use, in a redwood sump tank.

The sludge from the ordinary sluicing of the filter is returned to No. 3 thickener, as it always contains gold and cyanide. Ordinary sluicing takes 10 min. and the acid treatment about 90 min., so that the filter normally operates 96 per cent of the day. Redressing requires nearly five hours. This filter can clarify 1,000 tons of solution per day under these working conditions.

TABLE XI. CLARIFICATION COST PER TON OF ORE

	Operating Labor	Repair Labor	Supplies	Power	Total
1917	$0.0010	$0.0017	$0.0197	$0.0073	$0.0297
1918	.0004	.0020	.0337	.0100	.0461
Average	.0007	.0018	.0270	.0087	.0382

In both precipitation and clarifying costs, the only operating labor charged is that of changing cloths.

CLEAN-UP

The precipitation presses are dressed with four thicknesses of sheeting. The outside cloth is removed at each clean-up and a new cloth is added on the bottom. By this method no duck or canvas is required and the condition of the cloths as regards "liming up" is maintained nearly constant. When it is desired to clean a

press, the solution is cut off and the press is drained and blown with compressed air from 60 to 90 min.; this dries the precipitate to about 45 per cent moisture. The press is then opened and the precipitate is scraped into the precipitate wagon. The outside cloths, with some adhering precipitate, are removed and burned in a special furnace, and the resulting ashes are returned to the undried precipitate.

After determining the moisture content, the undried raw precipitate is fluxed with 11 per cent borax glass, 11½ per cent sodium bicarbonate, 6 per cent manganese dioxide, 3.3 per cent ground bottle glass, and at least 10 per cent of old slag shells from former melts, the percentage being in terms of the calculated weight of the dry precipitate.

A precipitate press ordinarily runs from five to six days, and yields about 130 lb. dry precipitate. In resuming precipitation after a final clean-up, one press is given the entire flow. When this builds up a pressure of 35 to 40 lb., the second press is opened just enough to maintain the pressure of the first press below 45 lb. When the second press reaches 20-lb. pressure, the entire flow is turned into it and the first press is cleaned. This method is carried on until the end of the month, when a final clean-up is made. The solution is metered by a revolution counter on the triplex pump, which is calibrated at intervals with a known tonnage of solution.

MELTING

The fluxed wet precipitate is placed in No. 5 paper bags and fed to an oil-fired No. 150 Case tilting furnace, using a No. 100 long-lipped, graphite crucible. When ready for pouring, the crucible contains fifteen sacks of precipitate and yields a 600- or 700-oz. button and from 40 to 50 lb. of slag. This charge is poured into a conical mold and allowed to set for a few minutes. The slag is then tapped through a hole about 2 in. above the gold button, and run into cold water for granulation. The granulated slag, which carries about 25 oz. of gold per ton and as much silver, is ground in a small mill and concentrated with a laboratory-size Deister table. The bullion buttons are remelted and cast into bars weighing about 150 lb. each.

TABLE XII. REFINING COST PER TON OF ORE

	Operating Labor	Repair Labor	Supplies	Power	Miscellaneous	Total
1917	$0.0437	$0.0051	$0.0710	$0.0004	.....	$0.1202
1918	.0444	.0026	.0366	.0008	$0.0017	.0861
Average	.0441	.0038	.0530	.0006	.0009	.1024

For convenience of comparison, the costs of clarifying, precipitating and refining for 1918 are also given per oz. of gold and per ton of solution precipitated:

TABLE XIII. 1918 COSTS PER TON OF SOLUTION PRECIPITATED

	Operating Labor	Repair Labor	Supplies	Power	Miscellaneous	Total
Clarification	$0.0001	$0.0006	$0.0098	$0.0029	.....	$0.0134
Precipitating	.0001	.0007	.0274	.0052	.....	.0334
Refining	.0129	.0008	.0106	.0002	$0.0005	.0250

TABLE XIV. 1918 COSTS PER OUNCE FINE GOLD RECOVERED

	Operating Labor	Repair Labor	Supplies	Power	Miscellaneous	Total
Clarification	$0.0003	$0.0019	$0.0318	$0.0095	.....	$0.0435
Precipitating	.0002	.0023	.0892	.0168	.....	.1085
Refining	.0419	.0025	.0345	.0007	$0.0016	.0812

REFINING COSTS

The costs of clean-up and refinery, as is the case with those of precipitation, were materially reduced in 1918 by the use of the vacuum process. The zinc content of the crude precipitate was reduced from 30 to 35 per cent to 6 or 7 per cent, and the bullion content was raised from 54½ to 71 per cent. This increase in metal content allowed the substitution of the No. 100 crucible for the No. 150, as the smaller size easily yielded a button from 600 to 700 oz., which is about as large as can be conveniently charged into a red-hot furnace without danger of cracking the crucible.

The cost of refining, averaging a little over 10c, is only about 4½ per cent of the total cost of operations.

The Metallurgy of Wulfenite*

Probably 90 per cent of the molybdenum produced in the United States during the war period was derived from molybdenite, according to J. P. Bonardi, of the U. S. Bureau of Mines, in spite of the fact that prior to 1915 the wulfenite ores of Arizona supplied the larger part of the molybdenum. This is attributable to the successful application of flotation to molybdenite and because the deposits of the latter are larger. The wet concentration of wulfenite ore offers little difficulty, but a number of associated minerals—vanadinite, cerussite, anglesite, galena, pyromorphite and mimetite—come out in the concentrate, rendering its subsequent treatment somewhat difficult. Usually, a concentrate of 15 to 20 per cent MoO_3 is the best that can be obtained, and buyers of concentrate frequently set the latter figure as their minimum content. Wulfenite has the advantage over molybdenite that it frequently has gold in association, and both this and the lead are recovered in the treatment of the concentrate.

Any of three methods of treatment may be used: (1) an acid leach; (2) an alkaline leach; (3) fusing with something that will reduce the lead to the metallic form and take the molybdenum into the slag. The first has so many disadvantages compared with the other two as not to merit much consideration. Of the various alkalies, sodium sulphide is, perhaps, the most satisfactory, as the molybdenum goes into solution as sodium molybdate, the lead and precious metals remaining in the residues. This process is used by at least one company in the United States at present. The high-grade calcium molybdate thus produced can be used for the production of ammonium molybdate, ferromolybdenum, or added directly to the steel in the manufacture of alloy steels. By fusing with soda ash, caustic soda, and coal, the lead is recovered in the form of bullion. The sodium molybdate thus formed can be leached from the slag and the metal precipitated in the form of calcium molybdate, which can be utilized as stated above.

In one of the experiments a recovery of 96.7 per cent was made on the molybdenum and of 98.5 per cent on the lead, and it is estimated that a 90 per cent extraction of both would represent commercial practice. At present prices there is a difference of $270 between the value of the products and the cost of the chemicals in treating a ton of typical concentrate, so that the process would seem commercially feasible.

The Gold Mines of Ontario, chiefly in the Porcupine district, have so far yielded $51,000,000 worth of the metal. The Cobalt camp has produced $185,000,000 in silver, and the copper-nickel mines of the Sudbury district have produced $138,000,000.

*From the *Journal of the Franklin Institute*, September, 1919.

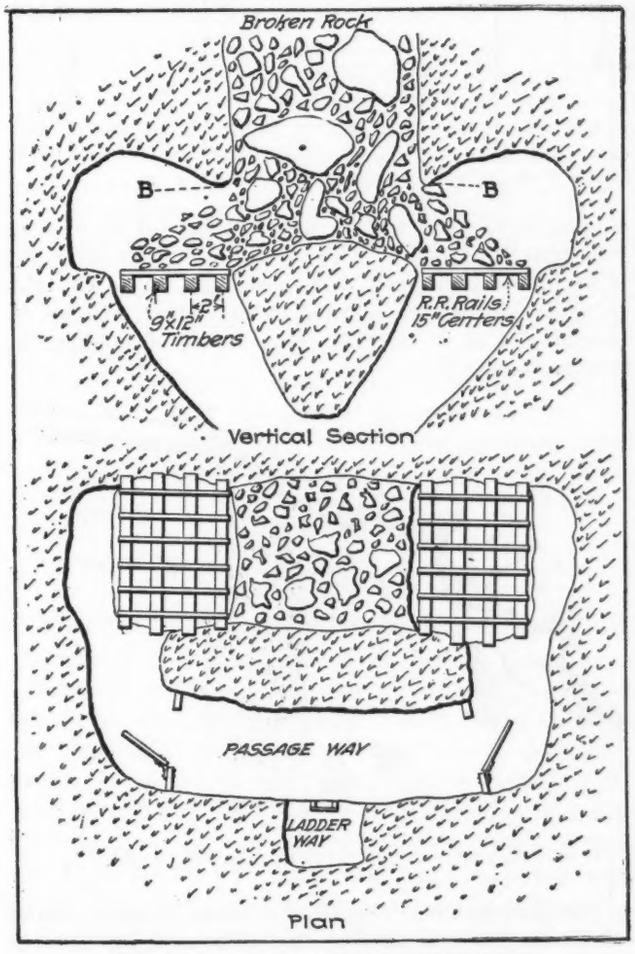
DETAILS OF PRACTICAL MINING

Suggestions From Practice for the
Superintendent, Foreman,
and Miner

Rock Grizzly at the Franklin Mine

BY A. O. CHRISTENSEN

A grizzly used at Franklin, N. J., for handling rock filling for the mine is illustrated in the accompanying sketch. The rock arrives through mill-holes as broken by the blasting, with little or no blockholing. The object of the grizzly is to act as a screen and separate



GRIZZLY FOR HANDLING ROCK FILLING

or classify the rock so that the proportion passing through will be of a size that may be delivered conveniently into tram cars by means of chutes.

The rough rock reaches the grizzly through the mill-hole, which is about 12 ft. in diameter. The capacity of the chute below the grizzly and above the haulage level is sufficient to hold whatever rock is produced during several shifts' work, so that failure to remove the rock from the chute may not immediately interfere with the running of the rock through the grizzly. Two separate grizzlies are employed, the capacity thus being doubled, one grizzly complementing the other in case of hang-up.

The critical feature of the arrangement is the brow marked *B*. Most of the work of running the rock through the chute is done by means of a bar operated just below the brow. If the brow is higher than a man's shoulder, the work is hard, tiresome, and dangerous, and it has been found that the distance of 5 ft. above the grizzly is the best height for *B*. Directly in front of the grizzly, and rising from a level with it, is a pile of material which is never disturbed and slopes up at its angle of repose. If the brow is situated over this pile, a part of the opening available trouble free running of the rock is lost and considerable trouble is caused by hang-ups and the entrance of chunks that are too large to pass through the opening. If the brow is placed back from the front edge of the grizzly, no purpose is served by the latter and it is subjected to harder use, because the chunks drop directly on the front edge from above, instead of rolling on it.

The length of the grizzly as measured from below the brow depends on the height of *B* and the angle of repose of the rock. Assuming this angle as 45°, and the height of *B* as 5 ft., the grizzly should be 6 or 7 ft. long. To make it greater than this would involve needless expense and is dangerous for the men when the run of rock begins after having been hung up.

Practice with various forms of grizzlies, and the study of their operation, show that, for this type, the following dimensions and arrangements have been found satisfactory: The grizzly itself is made of horizontal 9-in. x 12-in. timbers, fitted into hitches, strengthened, and protected from wear by angle irons and spaced 2 ft. between centers. Across these are laid heavy railroad rails, spaced 15 in. between centers, inverted, and overlaid with strips of 1-in. flat iron to take the wear. These may be bolted to the timbers in different ways, but provision should be made for effecting easy renewal.

Two men can work on each grizzly, but it has been found more economical to have one helper on each grizzly and one man in charge. Chunks that are too large to pass the grizzly or to be broken with a hammer are rolled to one side and blockholed until so many have accumulated that they interfere with the work. In blasting, both sides are fired at the same time, the doors in the passageway are closed, and the men enter the ladder-way and close the door above, to protect themselves from the concussion.

Safety Device for Dumping Ore Into Skips

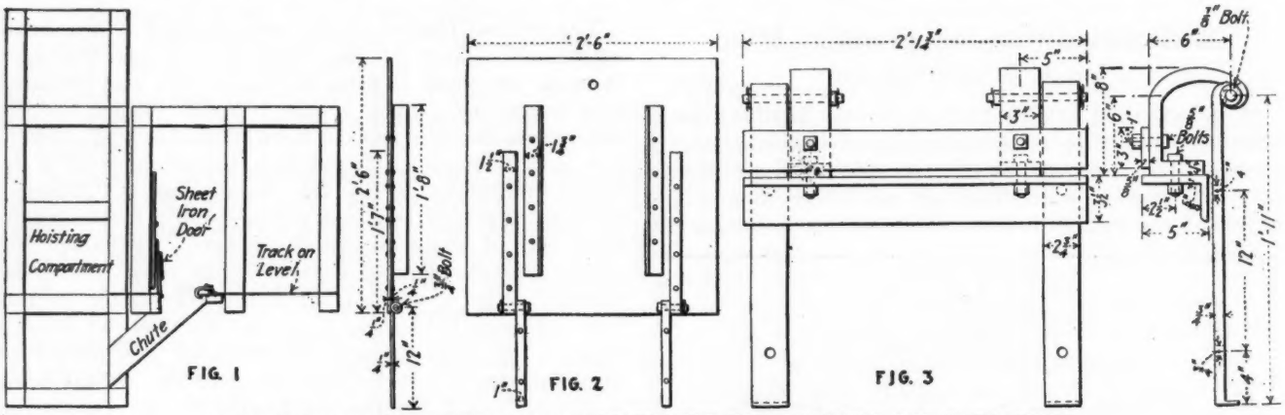
BY A. C. BIGLEY

Butte, Montana.

Station tenders dumping loaded ore cars directly into the skip from the station are in constant danger of being struck by rock falling down the shaft, and there is the possibility that the engineer may move the skip during the dumping operation and this often results in slight, serious, or fatal accidents. As a means of

overcoming injury from these sources and at the same time increasing the efficiency in dumping directly into skips (in the absence of skip chutes or ore pockets) a scheme was devised at the Berkeley mine of the Anaconda Copper Mining Co., of Butte, Montana.

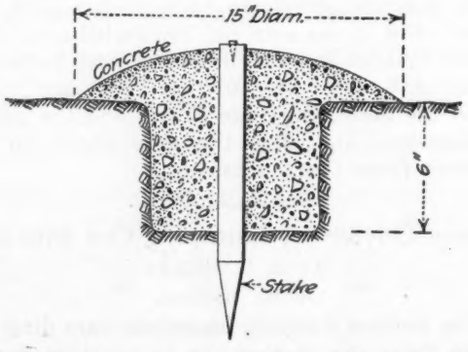
The ground in front of each hoisting compartment of the shaft was removed as shown in Fig. 1 and is lined on the sides and bottom with sheet iron, making a slide or chute with an opening into the shaft 20 in. deep and 19 in. wide. Sheet-iron doors, as shown in Fig. 2, cover the openings on the station floor when not in use. The doors when closed will not interfere with the caging of waste or handling of supplies on the station. . In order to provide a dump or stop for the cars as they are being emptied, the device shown in Fig. 3 was made, and this prevents the car from pushing ahead and holds it stationary while it is being dumped. After the skip has been filled, the stop is turned over and folded into the slide or chute, a part of it serving as a support for the door when it is closed. This method protects the station tenders from danger, as their work is done at a safe distance from the shaft, and all station doors are closed. By the use of the old method it was necessary to "re-spot" the skip after three cars were dumped, on account of the stretching of the rope. The skip can now be filled without "re-spotting," and an easier methd of dumping and handling of the cars is provided.



PLAN AND ARRANGEMENT OF SAFETY DEVICE FOR DUMPING ORE INTO SKIPS

Concrete Collar for Survey Station

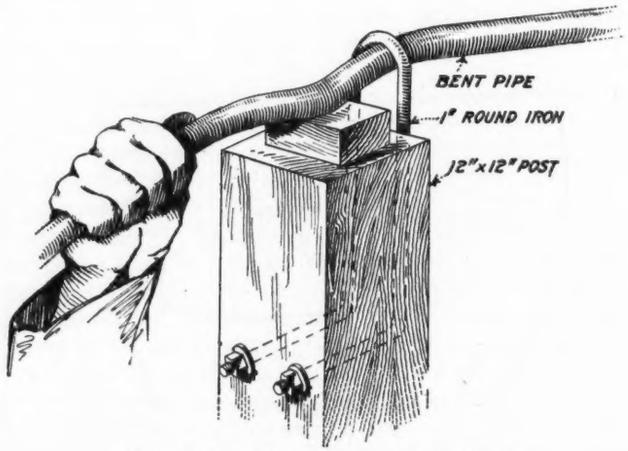
The sketch illustrates a method that may be used for the purpose of preserving reference stations in survey work, especially in the vicinity of an industrial plant or where construction operations are in progress.



METHOD OF CONCRETING SURVEY STATION

A Straightener or Bent Pipe

Pipes that have been laid through crooked drifts and up crooked raises are usually badly bent, and their much of the equipment is recovered from parts of the mine that have been worked out, an assortment of pipe removal requires further bending, and to this is added the falls of ground and shooting on the pipes. At most mines where development is progressing rapidly and accumulates. The major part of this will be of 1-in. size, bent and twitest. Pipe of small diameter is readily straightened sufficiently to be used again. This straightening should be accomplished by rebending, and not by pounding, and, to do this, some means of holding the pipe is necessary.



DETAIL OF BENT-PIPE STRAIGHTENER

The accompanying illustration shows a simple device which enables one man to straighten a large number of pieces of 1-in. pipe in a short time. It consists of a good-sized post, 8 x 8 in. to 12 x 12 in., set firmly in the ground, and about 4 ft. high. A piece of 1-in. round iron is bent into an elongated U-bolt, about 3 in. across the two arms, and the two ends are bent at right angle to the U-part, passed through the post, and fastened securely in place by nuts. In straightening a pipe, it is passed through the U and over a small block on top the post. The post is at over a small block on top of the post. The post is at such a height that the pipe is easily manipulated, and the length of pipe offers sufficient leverage to enable the workman to bend it with little exertion.

NEWS FROM WASHINGTON

By PAUL WOOTON
Special Correspondent

War Minerals Relief

An important ruling, having to do with net losses, has been made by the War Materials Relief Board in connection with a claim by two partners, one of whom had a two-thirds interest in the property, and also had interest in other properties with the same product. His profits on the other properties more than covered his loss in the one covered by the claim. His partner, having no profits from similar operations, was awarded one-third of the amount allowed on the claim, it being specified that the other partner was not to share in the award. The exact wording of the ruling is: "Net losses must be individual and must reckon with all operations of any claimant for the production of the minerals specified in the act. No claimant can be permitted to ask for an award for net losses from unsuccessful enterprises alone. The term 'net losses' must be construed as such; that is, when the result of all operations of the claimant in the named minerals is unprofitable."

About 154 claims have been thrown out by the commission, as it was clearly shown no request or demand was made by the Government agencies named in the bill. Many protests are being received, but the commission is unable to act otherwise in view of the Attorney General's interpretation.

National Conference of Labor

National Industrial Conference was called to order on October 6 by Hon. William B. Wilson, Secretary of Labor, temporary chairman; Rowland B. Mahany acting as temporary secretary. John Barrett, Director General of the Pan-American Union, extended a cordial welcome to the conference on behalf of the governing board, and concluded a graceful and felicitous address by expressing the belief that all present were working for good will, particularly co-operation, and permanent peace in American industry.

Temporary Secretary Mahany read President Wilson's letter of September 3, 1919, calling the conference. A roll-call showed that all save three or four invited by the President were present. Secretary Wilson delivered an address, wherein he referred to the fundamental causes of industrial unrest, and called attention to the fact that permanent industrial peace must be based on industrial justice, and that it is not sufficent that either side to an industrial controversy should be the sole judge of what constitutes justice.

It was resolved that each of three groups of conferees, representing Employers, the Public and Labor, should appoint three members of a committee of nine on permanent organization of the conference; and that, in like manner, a committee be appointed on rules and procedure. The conference, which promises to be of historical importance and great public service, opened auspiciously, an atmosphere of good feeling, public spirit, and desire to co-operate and to be mutually helpful, prevailing.

Exports of Mining Machinery

The exports of mining machinery from the United States during August, 1919, according to the figures of the Bureau of Foreign and Domestic Commerce, are as follows:

Countries	Oil Well	All Other
France	$ 2,100	$ 69,562
Italy	.....	205
Netherlands	.....	28,113
Norway	.....	6,223
Roumania	41,331	.....
Spain	.....	17,267
England	84	100,088
Canada	9,752	44,288
Costa Rica	.....	253
Guatemala	.....	1,150
Honduras	.....	1,227
Nicaragua	1,304	3,323
Panama	1,268	.....
Mexico	106,565	53,090
Miquelon, Langley	.....	2,165
Newfoundland and Labrador	200	.....
Barbados	866	.....
Trinidad and Tobago	4,428	.....
Cuba	4,421	9,098
Dominican Republic	153	.....
Argentina	33,933	.....
Bolivia	.....	2,532
Brazil	1,742	4,000
Chile	230	87,597
Colombia	.....	20,765
Eucador	705	302
British Guiana	23	.....
Dutch Guiana	.....	1,219
Peru	9,909	15,195
Venezuela	.....	255
China	.....	13,483
British India	31,183	3,359
Dutch Eash Indies	100,154	10,553
Japan	4,760	16,687
Russia in Asia	16,000	21,752
Siam	.....	1,723
Australia	35	54,729
New Zealand	.....	266
Philippine Islands	39,947	2,989
Belgian Kongo	.....	43,824
British South Africa	.....	58,056
Morocco	183	.....
Portuguese Africa	.....	38,207
Egypt	.....	158
Total	$411,276	$733,703

Tariff on Potash

Germany is boasting that she will continue to control the potash output of Alsace, according to Representative Kinkaid, of Nebraska. Mr. Kinkaid urged that the bill providing duties on imported potash be reported promptly to the House and passed, and also called attention to the potash resources of the United States, urging their development. He cited the fact that the American producers proposed that the maximum price for next year shall not exceed $2.50 per unit for their potash, in attempting to refute the claims that the potash bill will cause fertilizer prices to go to prohibitive levels.

Mine Taxation Discussed at Washington

Chicago Meeting Showed Need of Further Conference—Many Prominent Mining Men Take Part—Committees Formed to Consider Interests of Special Mining Industry

AT THE meeting of the American Institute of Mining and Metallurgical Engineers in Chicago, the subject of mine taxation under the income-tax and excess-profit tax laws was discussed by L. C. Graton, of the Bureau of Internal Revenue, who is in charge of copper in the division of Natural Resources of the Income Tax Unit. Mr. Graton read a paper on the subject of administrating the tax, which was discussed with great interest at several sessions, under the chairmanship of R. C. Allen. The Chief of the Division of Natural Resources, Mr. Darnell, was also present at the meeting, and requested further assistance and co-operation by the Institute. Owing to the feeling that further conferences were necessary, H. V. Winchell, president of the Institute, appointed a committee of the Institute to meet in Washington in co-operation with the Internal Revenue Bureau. This committee assembled on October 6 at the Treasury Building and was welcomed in a cordial speech by Commissioner Daniel C. Roper, and in brief speeches by Mr. Darnell and Mr. Graton. The personnel of the executive committee selected by President Winchell is as follows: C. F. Kelley, chairman, S. J. Jennings, James R. Finlay, R. V. Norris, J. E. Spurr, W. G. Swart, and Paul Armitage, secretary.

The fact was emphasized by Mr. Kelley, in addressing the committee, that the function of the body was to formulate principles of taxation and interpret the law, rather than to criticize the existing legislation and its administration. He made it plain that, if the committee did not point out improvements and formulate correct and satisfactory principles, the metal industry would not be in a position to criticise Congress or the Revenue Bureau for any alleged shortcomings. For further action, it was decided to divide the committee into three sub-committees as follows: (1) Committee on invested capital—F. S. Peabody, chairman; Walter Douglas, Mr. Peterson, Mr. Schofield, J. F. Callbreath, C. F. Kelley, and W. G. Mather; (2) committee on valuation methods—J. P. Channing, chairman; R. C. Allen, J. R. Finlay, R. V. Norris, Arthur Thacher, J. E. Spurr, John P. Gray, and George F. Wolff; (3) committee on depreciation and depletion—W. G. Swart, chairman; R. M. Bennett, Paul Armitage, H. A. Guess, F. L. Garrison, W. A. Williams, J. L. Bruce, Walter Fitch, and Mr. Schree.

These three subcommittees held frequent meetings, and when the main committee of the whole was convened on the afternoon of October 9, each of the subcommittees presented resolutions and recommendations, which they had drawn up, and which were submitted to the committee of the whole for such action as was thought desirable. The matter was referred by this committee to the excutive committee, which decided to go over these recommendations at Atlantic City on October 20, and then formulate them definitely, so that they could be presented to the officials of the Bureau of Internal Revenue. The executive committee was enlarged so as to include W. G. Mather, Walter Fitch, John P. Gray, Arthur Thacher and Walter Douglas, Mr. Darnell was made an associate member.

In the meantime it was arranged that the resolutions decided upon should be considered by specially constituted committees representing the principal mining industries, which committees would be formed by the various members of the executive committee, who would act as chairmen. These committees are as follows: Copper, Walter Douglas; coal, R. V. Norris; metal, W. G. Swart; lead and zinc, J. R. Finlay, and precious metals, J. E. Spurr.

As seen from the list of members of the Institute, who make up the general committee, this series of meetings was successful in bringing together men of wide experience, and in affording opportunity for intensive discussion of the vital problems connected with the administration of the income-tax law and the excess-profits tax law in regard to mines. Moreover, the spirit of co-operation shown by Commissioner Roper and his staff promises well for the future.

Organization of the mining unit of the subdivision of natural resources in the Internal Revenue Bureau is relatively new, the present staff of mining engineers having but recently entered upon their duties. It is owing to the efforts of Mr. Darnell and Ralph Arnold that such an organization has come into existence.

Chronology of Mining, September, 1919

Sept. 1—Strike of miners ended at Virginia City, Nev.—Yellow Pine Mining Co., Goodsprings, Nev., voluntarily raised wages 25-50 cents.

Sept. 2—House passed zinc tariff bill.—Fire broke out in abandoned stopes of Hercules mine, Burke, Idaho.—Wellington Mines, Breckenridge, Col., resumed operations.

Sept. 3—Senate passed oil-land leasing bill.

Sept. 4—Mining companies at Colbalt, Ont., issued statement of their position as to labor strike existing.

Sept. 8—Strike at Cobalt, Ont., ended.

Sept. 9—Suit for infringement of flotation patents filed against Nevada Consolidated Copper Co. by Minerals Separation North American Corporation and Minerals Separation, Ltd.

Sept. 10—U. S. Supreme Court, at Boston, handed down decision in suit of Louis Ross against Albert C. Burrage to obtain part of profits from sale of mining properties in Chile to Guggenheims; court ruled Burrage was entitled to only $100,000.

Sept. 14—Hurricane did much damage in various Texas oil fields.

Sept. 15—Public Lands Committee of House decided to expedite passage of general leasing bill.

Sept. 16—Herbert Hoover given dinner by A. I. M. E. in New York, upon arrival from Europe.

Sept. 18—Cloudburst put American Smelting and Refining Company's smeltery at Garfield, Utah, out of operation for several days.—First break occurred in Metal Crafts strike at Butte, Mont., when machinists voted to return to work.

Sept. 19—Governor of Minnesota vetoed Bendixen bill levying 5 per cent tax on iron ore.

Sept. 22—General strike of steel workers began.—School opened for teaching English to aliens in Utah mining camps, as required by state law.—Chicago meeting of A. I. M. E. and other societies opened.

Sept. 25—Fire broke out on 800 level of Homestake Mining Co., Lead, S. D., shutting down all mills.

Sept. 26—Arizona Commercial Mining Co. again filed suit against Iron Cap Mining Co., after former suits had been thrown out by Massachusetts court for lack of jurisdiction.

Sept. 27—Strike, which began August 19, settled at Chrome, N. J., plant of United States Metals Refining Co.

Sept. 29—Calumet & Hecla Mining Co. announced gift of life insurance policy to each of 10,000 employes.—New building dedicated at Pittsburgh, Pa., the U. S. Bureau of Mines experiment station.

New Process for Removing Sulphur Dioxide from Smeltery Smoke

A method for treating gases containing small amounts of sulphur dioxide, such as from 1 to 2 per cent, has been patented by E. V. Espenhahn, of the Broken Hill works, at Port Pirie, South Australia (U. S. Patent No. 1,315,183, Sept. 2, 1919). The gas is passed through a spray of sodium thiosulphate solution in washing towers or scrubbers, forming a solution of the polythionates. Part of this liquid is then heated to about 100 degree c., when decomposition takes place with the formation of sodium sulphate, sulphur dioxide, and free sulphur; the latter agglomerates into porous masses and is easily recovered.

The sodium sulphate solution is cooled, the salt precipitated out, filtered, mixed with coal or coke and heated to about 1,000 degree c., to form sodium sulphide. This is leached out of the fused mass and clarified. It is then brought into contact with a part of the polythionate solution, with which it reacts to form free sulphur and thiosulphate. The thiosulphate so formed is used to wash the incoming gases, making the process a cyclic one. Modifications of the process may be employed to produce concentrated sulphur dioxide, sulphuric acid, or thiosulphate.

September Pig-Iron Production

Pig-iron production in September, 2,441,554 tons, though 301,834 tons less than that of the 31-day month of August, was larger than July's output of 2,428,541 tons, according to Iron Age. The daily averages for September, August and July were 81,385, 88,496, and 78,340 tons respectively. The effect of the strike is shown in a net loss of 103 furnaces on the active list. Most of them were banked as October came in, but many are now in operation. Against a rated capacity of 93,360 tons daily for 265 furnaces active September 1, the rate of production of the 162 furnaces in blast October 1 was only 50,100 tons, indicating to how large an extent the larger furnaces were crippled.

Foreign Trade in Metals and Ores

Imports and exports of the more important metals and ores, as reported by the Department of Commerce for August, 1919, and the figures for August, 1918, as finally revised, are as follows:

IMPORTS, AUGUST, 1918 AND 1919

(In pounds, unless otherwise stated)

	August, 1918	August, 1919
Metals and ore:		
Antimony ore, contents	18,951	78,400
Antimony matte, regulus or metal	2,886,926	741,550
Copper:		
Ore, contents	5,581,878	4,172,049
Concentrates, contents	5,629,619	3,262,921
Imported from (in part):		
Canada	3,981,670	2,670,936
Mexico	8,935,251	3,204,371
Cuba	2,127,800	2,143,507
Chile	1,213,378	169,385
Peru	2,288,016	54,633
Venezuela	.....	720
Unrefined, black, blister, etc.	42,519,271	15,954,604
Refined, in bars, plates, etc.	11,708,671	1,429,343
Old, etc., for remanufacture	168,027	439,915
Composition metal, copper chief value	111,196	98,400
Lead:		
Ore, contents	2,802,856	860,654
Bullion, contents	12,397,866	4,959,021
Imported from (in part):		
Canada	2,678,977	300,765
Mexico	12,398,506	5,508,058
Pigs, bars and old	.....	1,120,089
Pyrites, long tons	59,730	30,705
Imported from (in part):		
Spain, long tons	17,674	21,275
Canada, long tons	41,469	9,430
Tin ore, long tons	825	38
Tin bars, blocks, pigs, etc	16,619,837	9,872,459
Imported from (in part):		
Straits Settlements	6,877,092	2,746,253
Dutch East Indies	5,481,194	.....
United Kingdom	1,417,929	5,901,348
Australia	780,640	224,000
Hongkong	1,103,545	.....
Zinc:		
Ore, contents	3,412,338	1,606,497
Imported from:		
Canada	1,247,740	195,646
Mexico	2,164,598	1,402,151
Blocks or pigs, and old	.....	11,545
Manganese ore, long tons	33,975	8,240
Imported from (in part):		
Cuba, long tons	972	193
Brazil, long tons	25,520	3,600
British India, long tons	1,650	.....
Tungsten ore, long tons	583	553

EXPORTS OF COPPER, LEAD AND ZINC

(In pounds)

	August, 1918	August, 1919
Copper:		
Ore, contents	107,120	.....
Concentrates, contents	34,000	10,500
Unrefined, black, blister, etc.	50,247	1,176,390
Refined, in ingots, bars, etc.	45,876,440	47,385,901
Exported to (in part):		
France	12,378,446	8,901,736
Italy	3,981,546	4,490,261
United Kingdom	22,393,031	11,358,619
Canada	4,088,948	1,217,643
Composition metal, copper chief value	29,477	1,226
Old and scrap	5,531	20,223
Pipes and tubes	303,601	295,856
Plates and sheets	762,052	591,784
Wire, except insulated	1,537,959	3,203,901
Lead:		
Pigs, bars, etc., produced from domestic ore	15,194,602	2,553,083
Pigs, bars, etc., produced from foreign ore	3,141,888	6,602,822
Exported to (in part):		
Canada	3,061,359	230,023
United Kingdom	12,711,666	.....
Argentina	1,500	1,272,252
Japan	2,174,018	3,304,086
France	.....	2,264,189
Brazil	268,987	758,719
Zinc:		
Dross	4,453,275	.....
Spelter:		
Produced from domestic ore	5,565,452	23,204,987
Produced from foreign ore	2,748,357	1,519,872
Exported to (in part):		
France	5,911,693	6,914,357
Italy	1,746,518	2,075,780
United Kingdom	156,715	11,390,296
Canada	487,273	236,042
Mexico	6,002	120
Japan	.....	4,048,994
In sheets, strips, etc.	2,545,289	3,964,278

By The Way

A Rare Find

"A new metal in the mining world of northern Ontario," says the Sudbury Star, "is to be developed by a syndicate of individual members of a well known firm of Sudbury, Ont., who have purchased a body of barytes north of the town along the line of the Canadian National Railways. The metal is high in chemical properties and is used extensively in the sugar, paint and rubber industries."—From a private source we are informed that this metal runs as high as 100 per cent in chemical properties, and is not considered unusual at that.

A Short Course in Timbering

Back in the days of the war, which is now so fortunately finished, it was the custom among some of the officer schools in France to send their young hopefuls out among the various engineer outfits for practical experience in technical work. A sergeant of the good old 27th relates one of his experiences with this type, showing vividly the importance usually attached to the intricacies of mining. It happened on one of the many cold, wet mornings that the sergeant had a detail busily at work timbering a dugout, when a natty young prospective shavetail breezed in with, "What's on today, sergeant, what are we doing?" "Timbering." "Timbering?" "Yup." "But I don't understand; there must be some mistake, I shouldn't have been sent here." "Why not?" "Why I took timbering yesterday."

Zinc in the Movies

Having seen several of the Ford Educational Weekly moving pictures during the summer, the secretary of the American Zinc Institute visited Detroit recently and called to the attention of the Ford Motor Company the educational possibilities of a film depicting the zinc industry, at the same time submitting a skeleton scenario, and that company at once agreed to make and distribute in connection with its Ford Educational Weekly service a moving picture showing the manufacture and uses of zinc. The photographs are now being taken, and when this work has been completed a committee from the Institute will assist in the editing of the film. The picture will be entitled "The Story of Zinc—the Everlasting Metal," and its sub-title, "An Exposition of Zinc from the Mine to the Roof of the American Home," indicates that it will include—beginning with the Missouri-Kansas-Oklahoma field—the mining, milling, loading, transporting, roasting and smelting of the ore, the casting and rolling of the metal, and the manufacture of sulphuric acid, zinc dust, zinc oxide and lithopone. Old and new uses of zinc will be particularly featured. It is planned to release the zinc film early in 1920.

Evils of Competition

The rivalry between shifts in getting out tonnage, though always encouraged by the superintendent, is nevertheless a frequent source of trouble to the latter. This is especially true on the iron ranges during the stock piling season, when tonnages are necessarily estimated and it is not easy to tell whether the various tricks resorted to are honest or otherwise. One of these subterfuges was accidentally brought to light by old Pierre, the stockpile roustabout at the Lake Angeline mine, in Michigan, back in the days when mines were operated on the unit system. Under this system a mine car filled a skip and a skip filled a stock-pile car.

The tally boy was also the skip tender, besides being related to anywhere from one to half a dozen of the men in the gangs at work. Old Pierre's understanding of the complexities of life was limited to the knowledge required to push the little car out on the pile and back to the skipway. Likewise he knew it was cold out on the dump. It was not in his mind either to hurt the plotters or help his employer when he hailed the captain one frosty morning and said: "Meestir captain, please to have de carpentair to put de leetle board on de side of de car. Now I can take two skip to one car; if I have de leetle board, I can take tree to one tam—and Cras, she's cold on de' h'end of de dump."

The Popular Diamond

Some interesting facts about the market for diamonds were disclosed recently by an American importer just back from a diamond-buying visit to Europe, states the Financial Times, of London. Diamond sales in Amsterdam are cosmopolitan gatherings, for in the crowd one sees Japanese, Chinese, Hindus, Mexicans, Turks, Persians, Australians, South Americans, and men from every country in Europe. According to the expert, there was never such a demand for diamonds as there is today. Japan has become an enormous purchaser. There were many Hindus and Brazilians among the buyers, but of the South American countries Argentina is the heaviest purchaser. India was once the world's sole source of diamond supply, and when the Indian mines failed Brazil held that position. The Indian mines are exhausted, and the Brazilian mines are either nearly exhausted or inadequately worked, and are no longer an important factor in the world's diamond output. Germans, Austrians, and Russians at Amsterdam, apparently with plenty of money, are buying all the diamonds they can get. All the neutral countries were heavy diamond buyers during the war, and their market demands are still immense. But it is surprising to find that Germany, Austria, and Russia, which are supposed to be down and out financially, should now be cutting such an important figure in the world's diamond markets. It is more than probable that the present instability of less concrete forms of property is responsible for the popularity of the diamond. Multum in parvo is certainly a sound motto for the modern millionaire who wishes to hold on to his riches.

PERSONALS

J. M. Hill, the geologist of the U. S. Geological Survey, who is in charge of matters pertaining to platinum, has returned from a visit to the Colombian platinum deposits.

William W. Mein was recently in San Francisco, leaving on September 26.

C. G. Dainpre, manager of the Associated Gold Fields, Larder Lake, Ontario, has resigned.

J. B. Tyrrell, of Toronto, is examining properties in the Rice Lake district, in Eastern Manitoba.

R. H. Stewart has gone to Texas in the interests of the Gunn-Thompson syndicate, of New York.

Robert A. Kinzie, in charge of operations of the Engels Copper Co., was recently in San Francisco.

Edward Mosehauer, of the United Metals Selling Co., will go abroad to represent the Copper Export Association in Germany.

Sidney L. Shouts, of Wallace, Idaho, has gone to California, being engaged by the Government in the adjustment of war claims of chrome producers.

D. G. Kerr, vice-president of the United States Steel Corporation, and a party of friends spent several weeks' vacation in the woods near Watersmeet, Mich.

Willet G. Miller, who has been in England as Canadian representative of the Imperial Mineral Resources Bureau, is expected to return to Toronto in October.

Harry W. Darling, field engineer for the Crown Reserve Mining Co., Ltd., was in San Francisco during September and expected to leave for Porcupine, Ontario.

Carl A. Allen, Utah Inspector of Mines, attended the dedication of the Pittsburgh laboratory of the Bureau of Mines, and visited several Eastern cities before returning West.

M. D. Foster, formerly chairman of the House Committee on Mines and Mining, now a member of the War-Minerals Relief Commission, is seriously ill at his home at Olney, Ill.

John F. Bethune has been appointed secretary of the U. S. Tariff Commission. The position is of particular importance at this time, owing to forthcoming revision of tariff laws.

A. R. Montagu has been visiting **W. S. Boyd,** in Ray, Ariz., after two years spent in investigation of the mineral resources of the State of Bahia, Brazil, especially in connection with gems.

Frederick Burbidge, of Wallace, Idaho, manager of the Federal Mining & Smelting Co., was in New York, and will return by way of Oklahoma, where the company operates several zinc mines.

Major Julius M. Cohen returned from France in command of the 319th Engineers. Major Cohen was Chief Engineer of Construction during the last year at Camp Pontanezen, Brest, France.

Carl Tombo, of Philadelphia, Pa., was in Placerville, Cal., Sept. 8 and 9, examining, with **Burr Evans,** consulting engineer of Placerville, a free-gold mining property in El Dorado County, near Placerville.

L. Keith Ward has been appointed secretary to the South Australian Department of Mines, succeeding **F. C. Ward.** L. Keith Ward will still continue in his position of government geologist and director of mines.

Harris & Ewing
JAMES M. HILL

John A. Percival, of New York, president of the Consolidated Interstate-Callahan Mining Co., recently inspected the property near Wallace, Idaho. Mr. Percival is also interested in other mining operations in the Coeur d'Alene district.

Warren C. Prosser, who has been superintendent of the Red Mountain Mines Co. for the last two years, has resigned that position to return to professional work in mineral and oil-land investigation, with headquarters in Denver.

Rudolph A. McGovern, general manager of the Caloric Co., Brazil, a subsidiary of the Mexican Petroleum Co., sailed from New York on Oct. 2, on a business trip to England, Belgium France, and Italy. After the tour Mr. McGovern expects to return to Brazil.

Frank N. Skeels, of Wallace, Idaho, mining engineer, is engaged in investigating the clay deposits of Idaho for the State Bureau of Mines and Geology, and in co-operation with the Federal Bureau of Mines. A bulletin will be issued covering the results of his work.

J. W. Bennie has transferred his headquarters to Gleeson, Cochise County, Ariz., in order to superintend the operation of one of the mining groups retained by the Shannon Copper Co., after the sale of its Clifton interests to the Arizona Copper Company, Ltd.

L. C. Graton has been employed by the Calumet and Hecla Mining Co. to make a complete geological survey of the entire territory owned, controlled, or managed by the interests in Northern Michigan, comprising 23,000 acres. It is expected the work will require two years.

J. Burns Read has been appointed assistant professor of mining engineering at the University of Illinois. Professor Read served as captain of ordnance in the Inspection Division of the U. S. Army during the war, and was in charge of the non-ferrous group of the metallurgical branch at Washington.

OBITUARY

H. P. Flint, superintendent of the Tom Reed mill, at Oatman, Ariz., was drowned recently while bathing in the Colorado River.

Frank Cochrane, chairman of the Canadian Government Railway Board and a former member of the Canadian Cabinet, died at Ottawa on September 22, after a protracted illness, at the age of 67. Mr. Cochrane was for some years Minister of Lands, Forests and Mines for Ontario.

John Trevarrow, Sr., aged seventy-six, died at his home at Mohawk, Mich., on September 21. He came from England in 1861, and worked at the old Central mine, and when the Mohawk mine opened he became head mining captain and directed the opening of this property, retiring in 1913.

Charles O'Connell, a prominent mining engineer of Northern Ontario, died at Haileybury, on September 20, from heart disease. Mr. O'Connell came from California, and was a pioneer of the Cobalt camp, being connected with the development of many valuable mines. He was several years manager of the Tough Oaks mine at Kirkland Lake, and until a short time before his death was manager of the Patricia property at Boston Creek.

Samuel Brady, agent of the Michigan Copper Mining Co. property, Ontonagon County, Mich., died on September 30, following an illness of two years, from cancer. Mr. Brady had been in charge of this property for thirty years, taking it over when it was known as the Minnesota. He was graduated from the Renselaer Polytechnic Institute, of Troy, studied in Germany and England, and was experienced in gold mining in the Black Hills and in copper exploration on Isle Royale before his connection with the Michigan company.

Robert Neil Dickman, a mining engineer of Chicago, died at La Jolla, Cal., on September 14, following an operation. Mr. Dickman was formerly of the mining engineering firm of Dickman & MacKenzie. Mr. MacKenzie was killed in 1905 by Yaqui Indians while on business in Mexico. Mr. Dickman, at the time of his death, was on the staff of Robert W. Hunt & Co. He was born in Cleveland, Ohio, his father being Franklin Dickman, justice of the Supreme Court of the State. Mr. Dickman was graduated at the University of Michigan in 1886. He leaves a widow and one son, Franklin.

Henry B. Underhill, Jr., president of the Selby Smelting and Lead Co., and a resident of San Francisco, died on September 14. In 1866 Mr. Underhill went into the employ of Thomas Selby, who built the shot tower which was destroyed by the fire of 1906. The Selby Smelting Works was first established at North Beach, in San Francisco, and was subsequently moved to Vallejo Junction. In 1905 the business was sold to the American Smelters Securities Co., a subsidiary of the American Smelting and Refining Co. For over fifty-two years Mr. Underhill was associated with the smelting plant in the business and financial end, making a specialty of selling the silver produced by the plant. He finally became the president of the company, which position he held when he died.

SOCIETIES

American Society of Civil Engineers held a meeting on October 1 at which A. L. Sonderegger presented a paper on "Physiography of Watersheds and Channels, and Analysis of Stream Action of Southern California Rivers, With Reference to the Problems of Flood Control." The paper appeared in "Proceedings" for August, 1919.

The Institute of Metals held the Sheffield meeting on September 24 and 25, the program of which included a kinematograph film display of brass melting in an electric furnace, and a souvenir pamphlet containing a list of the members attending and illustrated descriptions of the University of Sheffield, works to be visited, and a specially drawn map of Sheffield.

Natural Gas and Petroleum Association of Canada held its first annual meeting at Hamilton, Ont., on September 19. C. E. Steel, president, was chairman. The following papers were presented: "Petroleum in Ontario, Reminiscence and Forecast," by A. M. McQueen; "Oxy-Acetylene Welding in an Isolated Plant," by J. H. Stoliker; "History of Natural Gas in Ontario," by D. A. Coste. M. Y. Williams, of the Geological Survey of Canada, outlined the findings of his recent survey trip to the prospective oil areas in the James Bay district, and G. R. Mickle, provincial mine assessor for Ontario, presented an interesting paper on some phases of the natural gas industry in the province.

American Institute of Mining and Metallurgical Engineers, Denver Chapter, held a banquet on September 19, at the Savoy Hotel. The institute met for the purpose of taking action to bring about the repeal of the Colorado Engineers' Licensing Act. J. R. Grant, chairman of the meeting, was empowered to select a committee of three to take action in the matter. Robert Hursh, manager of the Empire Zinc Co.; George Collins, manager of the Mary Murphy Mining Co., and J. C. Roberts, of the Colorado School of Mines, were appointed. Horace V. Winchell, of Minneapolis, Minn., president of the A. I. M. E., was the guest of the Golden Chapter at a banquet held on October 15.

INDUSTRIAL NEWS

International Trade Conference, called by the Chamber of Commerce of the United States at Atlantic City, N. J., has been postponed from the week of September 29 to the week of October 30, owing to delays incident to the departure of delegates from Italy, France and Belgium.

The Bucyrus Co. has removed the southern sales office from New Orleans, La., to room 2, 212 Jefferson County Bank Building, Birmingham, Ala. C. N. Ballentine will remain southern sales manager, and will be assisted by E. J. Wilkie, who has been connected with the sales department at South Milwaukee, Wis.

NEW PATENTS

U. S. patent specifications may be obtained from the Patent Office, Washington, D. C., at 5c. each.

Alloying—Admixture of Metals or Substances for Alloying. Edmund Godfrey Burr. (1,315,208; Sept. 9, 1919.)

Barium—Process for Preparing Barium Hydroxide from Barium Sulfide. Edward A. Barnes. (1,316,133; Sept. 16, 1919.)

Blast-Furnace-Stack Reinforcement. James P. Dovel. (1,316,085; Sept. 16, 1919.)

Blast Furnaces — Heat-Recuperating Process and Apparatus for Blast Furnaces. James P. Dovel. (1,316,086; Sept. 16, 1919.)

Briquetting Finely-Pulverized Iron Ore, Method Of — A. Lammerhirt. (1,315,315; Sept. 9, 1919.)

Casting Machine. Edward Harker Acton, Frank Evans Dickie and Thomas Pratt, assignors to Aluminum Co. of America. (1,316,471; Sept. 16, 1919.)

Classifier (Mechanical) — Frank E. Marcy. (1,316,911; Sept. 23, 1919.)

Crushing—Ball or Tube Mill. Newton L. Hall. (1,315,770; Sept. 9, 1919.)

Crushing — Centralized Ball Mill. Morrisson J. Barnett. (1,316,670; Sept. 23, 1919.)

Crushing—Hammer Mechanism for Rock-Crushing and Other Purposes. John R. Abbott. (1,316,406; Sept. 16, 1919.)

Crushing—Reducing Mill. Edward B. Campbell, assignor to Williams Patent Crusher and Pulverizer Co. (1,315,281; Sept. 9, 1919.)

Drill. Charles Erb Wuensch. (1,316,609; Sept. 23, 1919.)

Drill—Rotary Boring-Mill. Howard R. Hughes. (1,316,094; Sept. 16, 1919.)

Drill-Puller. William M. Williams. (1,316,753; Sept. 23, 1919.)

Electric Furnaces — Electric Transformer Especially Suitable for Use in Connection with Electric Furnaces. James Bibby. (1,315,359; Sept. 9, 1919.)

Electrical Treatment—Apparatus for Treating Ores. Carl Cornwell. (1,316,769; Sept. 23, 1919.)

Electrode for Electric Furnaces. Paul Sejournet, assignor to Societe Electro Metallurgique Francaise. (1,315,992; Sept. 16, 1919.)

Flotation—Process of Treating Copper Ores by Sulphatization and Flotation. Niels C. Christensen, assignor to Metallurgic Improvement Corporation. (1,316,352; Sept. 16, 1919.)

Furnace Roofs — Art of Repairing. Benjamin Gold. (1,316,297; Sept. 16, 1919.)

THE MINING NEWS

New York, October 11, 1919

Fire Breaks Out in Homestake Mine at Lead, S. D.

Company Preparing to Flood Workings—No Men Laid Off—Mine Rescue

Fire broke out in a timbered stope between the 700 and 800 levels of the Homestake Mine at Lead, S. D., on September 25. Miners driving a drift for water lines on the 700 level ran into burning timbers on October 2. Efforts are being put forth to confine the fire to this area. Preparations have been made for flooding the mine, and during the interval the mills will be idle. All employees will be used on the surface until the fire is extinguished. In all probability the mine will be flooded to the 600 level within a month. During the fire of 1907 the workings were flooded to the 300 level in forty-seven days. The United States Bureau of Mines rescue car is on the ground from Livingston, Mont.

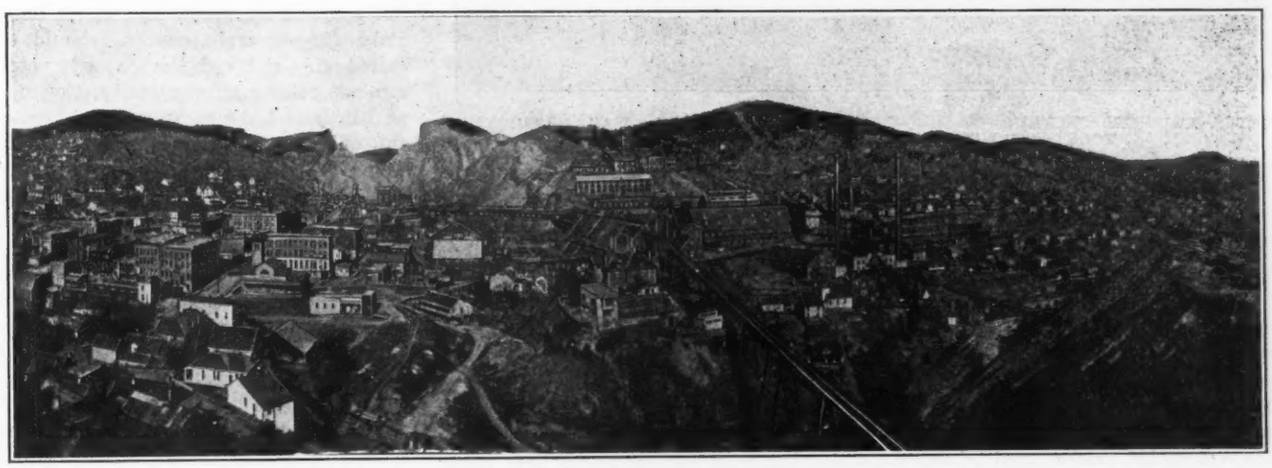
Texas Oil Companies Must Report to State Commission

New Law Imposes Fine For Failure, But Many Companies Have Not Complied

Under the new statute, passed last month, the Texas Railroad Commission has been given certain authority over the oil companies operating in the State. Carrying out the terms of this statute, the Commission called for reports from every oil company doing business in Texas, these to contain among other information the capitalization, amount of stock sold, price obtained, commission paid for selling, promotion costs, production, situation of wells, amount of oil sold, to whom, and price obtained. Due publicity was given to the requirements of this statute through the press, and so far 1,080 reports of oil companies have been received properly executed. Blank forms for reports have been prepared, and are forwarded on request. Judging from letters of inquiry about various oil companies, directed to the Commission, it is believed there must be as many more companies operating that have not filed reports as there are that have reported. Because the law is a new one, the Commission has not yet taken action to penalize these companies, but may proceed to do so after October 1. The penalty for failure to make a report may be a fine of $500.

Assessed Valuations Lowered on Cuyuna Range Orebodies

The State Tax Commission, following hearings held in St. Paul, Minn., on August 8 and September 24, and which were generally attended by Cuyuna Range operators and fee-owners, and at which the past and present condition of the manganiferous ore situation was thoroughly gone into, ordered on Oct. 2 a substantial reduction in the 1917 and 1918 assessed valuations of the Clark and Cuyuna-Sultana orebodies. The Commission reduced the 1918 assessed valuation of the Clark from $176,856 to $21,737, and that of the Sultana from $151,799 to $33,309. Similar reductions in the assessed valuations of other manganiferous or low-grade bodies of the Cuyuna are expected to follow as a result of this ruling. The experimental nature of the manganiferous ore market is given by the Comsion as a reason for their ruling, Rukard Hurd, secretary of the Commission, stating that "There never has been a normal demand, normal market, normal value or normal price for the manganiferous ores of the Cuyuna Range."



VIEW OF LEAD, S. D., SHOWING PLANT OF HOMESTAKE MINING CO. B. & M. SHAFT IS SEEN ON HILLSIDE IN CENTER OF BACKGROUND

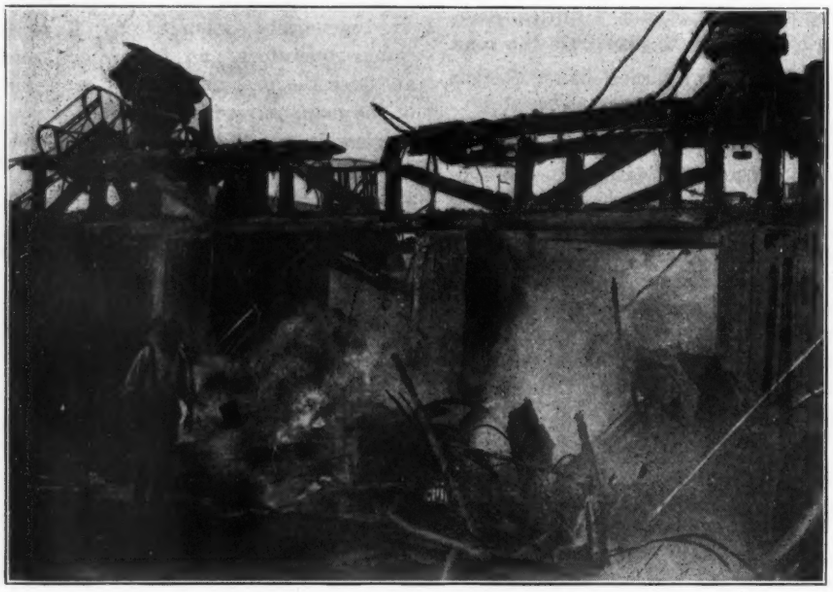
Boulder Railroad in Colorado May Be Scrapped

The Denver, Boulder & Western Railroad has been purchased by the Morse Bros. Machinery & Supply Company, of Denver. This road, 49 miles in length, in Boulder County, connects Ward and Eldora with Boulder, and is the outlet for practically all the mining towns and districts of Boulder County. It is a narrow-gauge line, laid with 56-lb. rail, and is completely equipped with eight locomotives, ninety freight cars and passenger coaches. The Morse Bros. company have offered this road to the mining men and commercial organizations of Boulder County, in order that the road may remain of service to the community. An earnest effort is being made by these organizations to save the road from being taken up. The cost of the road was considerably over a million dollars. Permission has been given the owners by the Public Utilities Comsion of Colorado to dismantle the road.

Insurance Gift Pleases Employees of Calumet & Hecla

The most important subject of discussion among mining men of the Michigan copper district during the last week was the blanket life-insurance policy put into operation by the Calumet & Hecla company for its 10,000 employees. The plan generally caused favorable comment among the workers. The insurance costs them nothing. No medical examination is to be required.

underground mining men have always found it difficult to secure life insurance owing to the hazard of their work. The Calumet & Hecla company is generally credited with the same forward-looking policy as it has showed in putting into effect the same compensation regulation that the State now requires of all corporations two years before there was agitation for such a compulsory regulation. The value of these policies ranges from $1,000 to $1,500.



GATES CRUSHER SECTION OF BROKEN HILL SOUTH MILL WAS DESTROYED TOGETHER WITH OTHER PARTS OF THE PLANT

Australian Gold Exports Bring High Premium

In Australia the Gold Producers' Association recently made a distribution of approximately £120,000, which had been realized on the disposal of gold in the East at a premium. That represented transactions by the organization to June last. Since then largely increased sales of the precious metal have been effected. Prices received in the early part of July were much lower than those obtained formerly, owing to the advent of the Americans as heavy sellers. This condition, however, was corrected subsequently as a result of the variation in the rate of exchange, and as a consequence gold, which is now being sold in the East, is again commanding fairly high premiums, as the demand is very extensive. Australia produces annually something like £3,500,000 to £4,000,000 in gold on the average in normal times. The premiums obtained by the Gold Producers' Association on sales effected down to the end of June last was 5s. 7d. per oz., and even if future negotiations should not yield quite as high a figure, it is hoped that by augmentation of production and consequently of sales, very satisfactory business from the sellers' standpoint will continue to be recorded. The only question is how long the Commonwealth Government will allow the permit to export gold to remain in force.

Birmingham Situation Improving

Strikers Gradually Seeking Re-instatement and Conditions Approaching Normal

On Sept. 26 the Woodward Iron Co. blew in its No. 1 furnace which has been idle for several months, undergoing repairs. This was done in face of the union threats to cripple the Woodward company by extending the strike in this district to include all plants of the company. No record is given of the actual number of men who went out on the strike order which followed the union threat but from unofficial sources it develops that a considerable number of skilled men walked out. The company succeeded in replacing these for the most part and by shifting from various plants kept going on full schedule. It is now reported that the majority of the strikers have returned to work.

At the various plants of the Tennessee Coal Iron & Ry. Co., men who struck are being rapidly reinstated or are asking for reinstatement. This company has put on a night shift of about 200 men at its No. 6 mine at Muscoda, the night shift having been abandoned several months ago. It is said that this night work will be permanent. The Bessemer Rolling Mills (Tennessee Coal Iron & Ry. Co.) apparently is not affected yet by the strike as practically all of the skilled men have remained at work and the plant continues to roll its regular output. Nos. 1 and 2 furnaces are running with full crews and Nos. 3 and 4 are idle but have been so for some time.

Scholarships at Sudbury

The International Nickel Co. of Canada has founded three scholarships to be awarded by competition to apprentices and minor sons of its employees. The scholarships cover the regular four years course at Queens', Toronto, or McGill Universities and are of sufficient value to meet entire cost of the course. First examinations for scholarships were held at Sudbury High School.

Hurricane Hits Somerset Oil Fields in Texas

Somerset Field, near San Antonio, Tex., was hard hit by the hurricane that swept the Gulf Coast country Sept. 14. The largest losses were sustained by the Gulf Production Co., ten of whose derricks were blown down, and Grayberg Oil Co., which lost eight derricks. Several other derricks were also destroyed. Nearly all wild cat derricks near San Antonio were blown down. Strangely, this territory was more damaged than other fields closer to the coast.

Kirkland Lake Strike Failing

Lake Shore and Teck-Hughes Companies Resume—Labor Scarce in Gold Camps

A short time ago a vote was taken in Kirkland Lake and the outlying camps to see whether or not the strike, which has stopped all production in Kirkland Lake for several months, should be called off. Although the majority voted against calling off the strike, the men at Kirkland Lake camp itself, which is the only one of importance, were in favor of returning to work. Several mines have therefore decided to resume operations. The Lake Shore has taken on a small force of men, as has also the Teck-Hughes. The forces will be gradually augmented as the different companies get into better positions. Apparently there is no attempt on the part of the union to prevent the men working. The men persisted in striking, despite orders from headquarters, and now after several months' idleness, are going back to work at practically the old scale of wages, some of the lower paid men receiving a small increase.

The gold mines of northern Ontario, and particularly Porcupine, are suffering from a shortage of labor. It is stated that the Hollinger could use another thousand men, while the Dome would be able to take from one to two hundred men. With the ending of the strike in Cobalt and the return of a large number of men to their old positions, the situation in Porcupine is still further aggravated. During the winter months numbers of men usually go into the bush to cut pulpwood, and were it not for the fact that there is likely to be a large number of unemployed in Canada during the coming winter, the situation in the mines might be serious.

PROGRESS OF MINING OPERATIONS

Important Events of Interest
Condensed and Classified
for Easy Reference

ALASKA

Alaska Gold (Juneau)—Milled 176,870 tons ore in September, averaging 83.9c per ton; per cent extraction, 81.88; and tailings loss 15.2c.

ARIZONA

Cochise County

Blackhawk (Bisbee)—Full face of high-grade copper ore developed in drift on 650 level. Same ore body was cut at 450 ft. Nighthawk Leasing Co., operator; James Z. McKenna, superintendent.

Calumet & Arizona (Bisbee)—September production of copper was 4,494,000 lb., of which 3,318,000 lb. was available for company.

Shattuck-Arizona (Bisbee)—September production was 70,412 lb. copper, 690,222 lb. lead, 4,919 oz. silver, and 10.61 oz. gold.

Courtland District is renewing activity, with 60 men working on the Great Western and other properties.

Mascot (Dos Cabezas)—Test of new 150-ton mill reported satisfactory. Milling ore in sight and on dumps estimated at 1,000,000 tons. John W. Prout, Jr., in charge.

Tombstone lessees on the old bonanza mines now owned by Phelps-Dodge Co., are shipping 80 carloads of ore a month.

Gila County

Arizona Globe (Globe)—Ores will be treated in mill of Gibson company pending construction of own mill.

Castle Dome Development (Globe)—Drilling on 700 acres 12 miles from Globe. Reported to have cut 130 ft. of copper ore.

Iron Cap (Globe)—Concentrator to be constructed. David Cole, consulting engineer.

Graham County

Stargo (Morenci)—Shipments have begun from property, compressed air being furnished by Phelps-Dodge power plant quarter-mile away. Present shipments being made from old workings on 75-ft. level, but development is in progress at 185 level. David Fennesy, of El Paso, designing mill based on recent ore tests made by General Engineering Co., of Salt Lake City. Property owned and controlled by Stargo Syndicate composed of Arizona people and is not incorporated.

Greenlee County

Arizona Copper (Clifton)—September production of copper 2,900,000 lb.

CALIFORNIA

Amador County

Argonaut (Jackson)—Concrete foundations are being placed for new hoist. Stamp mill is operating to capacity.

Calaveras County

Lee Mine (Altaville)—Recent developments include unwatering of shaft, construction of gallows frame, and installation of hoist. Plans for near future consider sinking shaft 200 ft. below present depth.

Carson Hill Gold (Carson Hill)—Company has sold $450,000 7 per cent 4-year convertible notes to private syndicate. Proceeds used to pay off the $450,000 balance of $600,000 loan from American Zinc, Lead & Smelting Co. Net profits earned in September, about $75,000; total net since Jan. 1, when operation began, nearly $500,000. Broad development campaign will begin soon.

Morgan Hill (Carson Hill)—Being operated by W. J. Loring. August cleanup, $104,000.

Sierra County

Tightner (Alleghany)—Directors, on Sept. 29, gave bond and option over number of years to Fred Searles, Jr.; active operations to begin in 30 days and preparations about complete. Includes Tightner placer, Eclipse, Red Star, Arlene and West Extension.

COLORADO

Boulder County

Emmett (Jamestown)—Mining fluorspar and delivering to Lehman mill at Jamestown and Pitchblende mill at Springdale. Green Transportation Co. has contract to deliver 300-500 tons per month to shipping bins at Boulder. Argo, Brownspar, Blue Jay and other properties (not Emmett Co.'s) to be reopened.

Interstate Metals (Salina)—New flotation plant almost ready. Arthur Buckbee, manager. Will do custom business though built primarily as experimental plant.

Victoria Group (Salina)—Owners will develop lower ore horizons by long tunnel. Mine has been steady though small producer of high-grade silver ore.

Ouray County

Guadaloupe Group (Ironton)—Being worked by two lessees, namely, Guadaloupe Leasing Co. and A. E. Ackerson. Former has built large boarding house and installed small gasoline power plant; also driving 300-ft. drift and 90-ft. raise; 17 men employed. Ackerson lease building bunk house and working four men.

Camp Bird (Ouray)—Has completed transportation tunnel which connects with old mine workings. Work in progress several years. To complete work required 11,000 ft. of cross-cutting, 1,700 ft. of drifting, and 500 ft. of raising. Tunnel cut 15 new veins.

IDAHO

Boise County

Golden Age, Jr. (Pioneerville)—Preparing to drive development tunnel, and to install ball mill for regrinding concentrates tailings. Carload will be shipped early in October.

Bonner County

Idaho Continental (Port Hill)—Snow motors building in Spokane; will be used to haul ore to Port Hill, 26 miles distant from mines.

Shoshone County

Nabob (Beeler)—After completing 150-ton mill, financial troubles overtook company through inability to pay employees. Numerous liens filed and all operations suspended. Major Griggs now in New York to confer with officers of Stewart Mining Co., which controls Nabob. Understood to have much lead-silver and zinc ore available for mill.

Idaho-Carbonate Hill (Mullan)—Ore shoot averaging five ft. wide has been developed on 400 shaft level with drift still in ore. Work suspended temporarily while diamond-drill tests are being made to prove ore at further depth. Striking this ore is important on account of situation of property in section of district heretofore without proved mineral merit. Ore is lead-silver with a little zinc. Property controlled by W. D. Greenough.

Midnight (Mullan)—Lead-silver and zinc ore varying from a few inches to three feet developed for 250 ft. on north vein, reached by crosscut from Fanny Gremm tunnel level. Controlled by Jones & Baker, of New York.

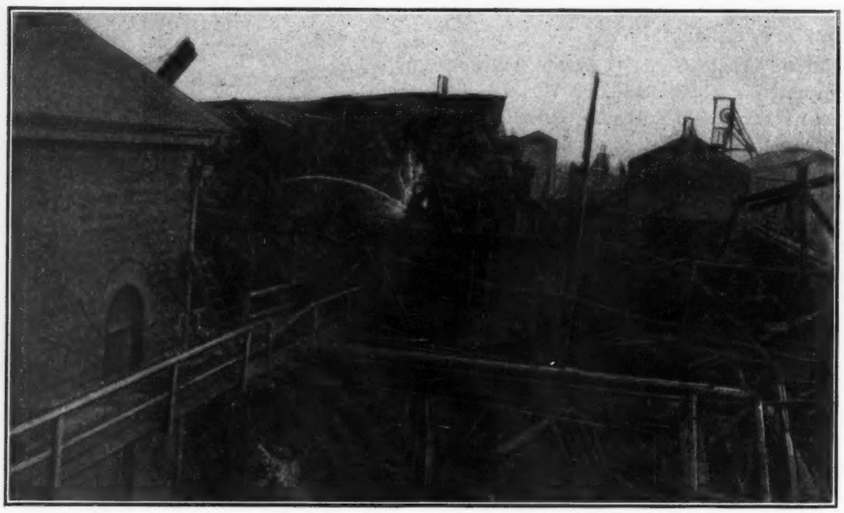
Linfor (Wallace)—Linfor Copper Mining Co., successor to Empire Copper Mining Co., preparing to resume operations on Little North Fork. Property developed by 350-ft. shaft, with large block of medium-grade copper ore on lowest level. Has 150-ton mill. Under management of William Beaudry, formerly manager of Stewart.

MICHIGAN

Copper District

Calumet & Hecla (Calumet)—Continues to secure good results in reworking old sands which are now coming from depth of 100 ft. in lake and are running 18-lb. copper per ton. Cost under 8c. Production from sands this year will total 11,000,000 lbs., which will make total of 36,315,000 lbs. from lake. Estimated life of sandpile 35 years. Pebble importations from Denmark and France continue.

Seneca (Calumet)—Second level laterals opened this week, following suspension of hoisting for baling. Concreting in shaft and laying of rails necessary before sinking is resumed. No mill plans announced as yet.



INCENDIARY FIRE AT PLANT OF BROKEN HILL SOUTH SILVER MINING CO., BROKEN HILL, NEW SOUTH WALES, ON JULY 30, CAUSED $500,000 LOSS.

Mayflower (Houghton)—Shaft down 1,520 ft. in trap. Identity of formation still undetermined. For 100 ft. there has been mixture of amygdaloidal matter (which alone carries some copper) and trap.

Victoria (Rockland)—Eight-ton skips will replace buckets for efficiency. Shaft at 2,700 ft. in mass copper and barrel rock. Four-ton mass taken out this week.

TEXAS

Brazoria County

Gulf Production (West Columbia)—Hogg No. 3 well pumping 150 barrels daily.

Statex Oil (West Columbia)—No. 1 Curson well came in September 23 at 3,000 ft., shooting oil over derrick, and gushing at rate estimated 5,000 barrels daily, with heavy gas pressure. Well is 1,100 ft. west of main field. New well, No. 1 Ehman, started on adjoining lot.

Texas Co. (West Columbia) — Brought in Hogg No. 15 well September 18 at 3,100 ft., making 1,500 barrels daily at start. No. 19 Hogg well being tested below 3,000 ft.

Fort Bend County

Gulf Co. (Blue Ridge)—Derrick destroyed in recent hurricane being rebuilt, and work will be continued.

West Production (Blue Ridge) — Slight blowout occurred in setting screen in new well, and second and smaller screen must be set before well can be tested. Conditions good for producing well.

UTAH

Juab County

Tintic shipments week ended September 27 were 120 cars.

Chief Consolidated (Eureka)—New shaft down 735 ft., being drained by drift which is being driven toward shaft at 1,000-ft. depth. Pumps lifting 900 gallons per minute. Good production coming from workings below water level. Shipments limited owing to present metal prices.

Godiva (Eureka)—Work suspended owing to price of lead. Winze sunk to 1,350 level to be continued to 1,500 or 1,600 level.

Iron King (Eureka)—Large blower installed and about 1,000 ft. of ventilating pipe now in place in 1,545-ft. shaft. Will continue sinking for short distance and then start drifting.

Pinion Queen (Eureka)—Power connections being made by Utah Power & Light Co. New connections being installed and building constructed. Knights interested.

Tintic Standard (Eureka) — Company experimenting on low-grade ores with view to building mill. Shipping good tonnage of high-grade ore.

Summit County

Silver King Cons. (Park City)—Has made first shipment of 106 tons from new strike on Electric Light claim. Net returns, $61.15 per ton. Two lots ready for shipment.

Salt Lake County

Ohio Copper (Lark)—Experimental work at new flotation plant completed and mill shut down pending final report as to results. Several hundred tons of ore handled daily in making tests. West end of mill and part of crushing plant destroyed by fire in 1918 have been repaired. Bond issue and increase in capitalization ratified by stockholders. Plans for financing under way.

CANADA

Ontario

Cross Lake (Cobalt)—Shaft down 225 ft. Crosscutting on 210 level.

La Rose Consolidated (Cobalt)—Discovery of high-grade ore made at 100-ft. level. Will also drill on rich vein found on University property just before recent labor strike.

Paragon-Hitchcock (Elk Lake) — Shaft down 200 ft. Drifting on 24-ft. vein of calcite and aplite with some native silver.

Castle (Gowganda) — Good ore discovered on surface.

Teck-Hughes (Kirkland Lake) — Miners being engaged following recent shutdown owing to strike.

Wasapika (West Shining Tree)—Orebody reported to be 50 ft. wide. Crosscut at 100 level.

Murray-Mowgridge (Wolfe Lake)—Shareholders have ratified reorganization plan involving sale of assets to new company, known as Murray-Mowgridge Mines, Ltd.

Quebec

Bishop Claims (Lake Du Parquet)—Timmins interests of Hollinger Consolidated Gold Mines have secured option on this property, situated close to Quebec-Ontario boundary near Lake Abitibi. Geological conditions reported to resemble those of Porcupine field. Small rush to this section last year, but up to present nothing further has been done.

MEXICO

Chihuahua

American S. & R. (Chihuahua)—Erecting big machine shop at Avalos smelter, costing over 50,000 pesos.

Las Liones G. & S. (Ojo Caliente)—Operations are expected to be resumed at once. Ore shipped to smelter at El Paso, Tex., via Mexico Central R. R.

CHILE

Chile Copper (Chuquicamata)—August production of copper, 8,994,210 lb.; July, 7,161,444 lb.

PERU

Cerro de Pasco (La Fundicion)—September production, 5,266,000 lb. copper; August, 5,726,000.

THE MARKET REPORT

Daily and Weekly Metal and Mineral Prices,
Metal Market Conditions, Average
Monthly Prices, Stock Quotaticns

Silver and Sterling Exchange

Oct.	Sterling Exchange	Silver		Oct.	Sterling Exchange	Silver	
		New York, Cents	London, Pence			New York, Cents	London, Pence
2	422½	120¾	64¼	6	422½	120⅜	64
3	422½	118⅜	63	7	421½	118⅛	63
4	421½	120	64	8	418	117⅞	63⅜

New York quotations are as reported by Handy & Harman and are in cents per troy ounce of bar silver, 999 fine. London quotations are in pence per troy ounce of sterling silver, 925 fine.

Daily Prices of Metals in New York

Oct.	Copper	Tin	Lead		Zinc
	Electrolytic	Spot	N. Y.	St. L.	St. L.
2	21¼@21½	53¾@54	6¼	6	6.90 @7.10
3	21¼@21½	53¾@54	6¼	6	7.075@7.125
4	21¼@21½	53¾@54	6¼	6	7.10 @7.15
6	21¼@21½	54 @54⅛	6¼	6	7.¼ @7.⅜
7	21½@21¾	53⅝@53⅞	6.25@6.30	6	7.¼ @7.½
8	21½@21¾	53⅝@53⅞	6.25@6.30	6	7.40 @7.50

The above quotations are our appraisal of the average of the major markets based generally on sales as made and reported by producers and agencies, and represent to the best of our judgment the prevailing values of the metals for the deliveries constituting the major markets, reduced to basis of New York, cash, except where St. Louis is the normal basing point.

Quotations for copper are for ordinary forms of wire bars, ingot bars and cakes. For ingots an extra of 0.05c. per lb. is charged and there are other extras for other special shapes. Cathodes are sold at a discount of 0.125c. per lb.

Quotations for zinc are for ordinary Prime Western brands. We quote New York price at 35c. per 100 lb. above St. Louis. Tin is quoted on the basis of American tin, 99 per cent grade.

London

Oct.	Copper			Tin		Lead		Zinc	
	Standard		Electro-lytic						
	Spot	3 M.		Spot	3 M.	Spot	3 M.	Spot	3 M.
2	103⅛	101¾	112	277	275¼	25¾	26⅝	41	41¾
3	103¼	101¾	112	278	276¼	25¾	26½	41	41¾
4	....	....	....	....	....	....	....	....	....
6	104	103	113	283	282	25⅞	26¾	41¼	42
7	103¾	103	113	282	282½	26	27	42	43
8	103¾	103	114	281	281½	26¾	28	41¾	42¾

The above table gives the closing quotations on the London Metal Exchange. All prices are in pounds sterling per ton of 2,240 lb.

Metal Markets

New York, Oct. 8.

There was better sentiment in all of the markets this week, which was reflected by slightly higher quotations for copper, lead and zinc.

Our advices from Europe are to the effect that the stocks of metals, especially of lead and spelter, are being reduced both in Great Britain and on the Continent, and it is expected that before long Europe may be a buyer of zinc and lead.

Transatlantic freights are about the same. To British ports, $15; to Havre, $12; to Rotterdam, $10; and to Hamburg, $13. Transpacific freights, San Francisco to Hongkong and Kobe, declined to $18.

Copper

A fair volume of business was done by agencies and by brokers, but the principal producers did nothing worth mentioning except through the Export Association. The latter did some business with several quarters, including Germany, and there were also some export sales made outside of the Association. Domestic consumers evinced some interest in buying copper, and it is not unreasonable to expect that some business with them will ensue ere long. In the meantime, it appears that the copper for sale by brokers has been cleaned up, and the smaller producers who have been selling have raised their prices a little.

Our latest advices from Japan, by mail, are to the effect that the copper market there is very dull, with very little being done at present. It is generally believed that no recovery in the market can be expected until Japan has digested the larger part of the purchases that she made in America earlier in the year.

Tin

There was a better sentiment in the tin market, and prices were a little firmer until Oct. 7, when very heavy arrivals of Straits tin resulted in a general easing of prices.

Straits tin was quoted at 55c right through the week.

Singapore quoted £274½, c. i. f., London, on Oct. 2; £276 on Oct. 3; £281 on Oct. 6; £284 on Oct. 7 and 8.

Lead

The statistical position is very strong. Only a few producers have any lead to offer. This week they realized an advance over the price asked by the A. S. & R. Co. At the same time there was still some business in small lots of lead done by second-hands at low prices, under conditions similar to what we reported last week.

The situation in the Coeur d'Alene remains unchanged. The St. Joseph Lead Co. started work at Herculaneum on Oct. 4, but blast furnaces will not go into operation until Oct. 9. Labor troubles are now reported from Alton.

There were some sales of lead for export. For bonded lead, 5¾c is asked.

Zinc

Zinc advanced sharply on rather large buying, which appeared to be mainly of speculative character.

High grade zinc was sold at 8c. Ordinary prolong zinc dust at 9½c.

Antimony—The market was unchanged at 8½c for spot. Futures were quoted at 9c.

Quicksilver—The price declined sharply, and the market closed unsettled at $95. San Francisco telegraphed $98, barely steady.

Silver—Silver is working on the level of 63d. to 64d. in London, but owing to the demand for the East, direct shipment from San Francisco commands a premium of 1c per oz., more or less. Otherwise, there are no developments in the silver situation.

Mexican dollars at New York; Oct. 2, 92⅞; Oct. 3, 91; Oct. 4, 92; Oct. 6, 92⅜; Oct. 7, 91⅜; Oct. 8, 91⅜.

Platinum—We quote refined ingot at $130@$135.

Palladium—Unchanged at $120.

Monthly Average Prices for September

Lead, New York	6.108c
Lead, St. Louis	5.853c
Lead, London	£25.330
Zinc, New York	7.510c
Zinc, St. Louis	7.160c
Zinc, London	£40.955
Silver, New York	114.540c
Silver, London	61.668d
Copper, electrolytic, N. Y.	21.755c
Copper, standard, London	£100.767
Tin, New York	54.482c
Tin, London	£280.102
Bessemer pig iron, Pittsburgh	$29.35
Basic pig iron, Pittsburgh	27.15
No. 2 foundry, Pittsburgh	28.15

Copper Sheets—33½c per lb. Demand strong. Wire, 25½@26½c. Market weak.

Zinc Sheets—$10.50 per 100 lb.

Aluminum—33c per lb.

Bismuth—Unchanged at $2.96.

Cadmium—Unchanged at $1.40.

Nickel—Ingot, 42c; shot, 43c; electrolytic, 45c.

Pyrites—Spanish pyrites is quoted at 17½c per unit for furnace size ore, free from fines, c.i.f. New York or other Atlantic ports. Sulphur companies reported to be selling at prices as low as 14@15c. Market unsettled.

Tungsten Ore—A little business in Chinese ore was done at $7. For high-grade wolframite, $10.50 was still asked.

Molybdenum Ore—Considerable tonnage of molybdenite was sold at 75c per lb. of molybdenum sulphide.

Chrome Ore—Considerable business was done in ore for both the chemical trade and for metallurgical purposes. Ore of 40 to 45 per cent grade was quoted at 65c per unit, delivered in the East.

Manganese Ore—Market dull and no business reported.

Zinc and Lead Ore Markets.

Platteville, Wis., Oct. 4.—Blende, basis 60 per cent zinc, $43.50 for premium grade and $42.50 for Prime Western Grade. Lead ore, basis 80 per cent lead, $72 per ton.

Joplin, Mo., Oct. 4.—Zinc blende, per ton, high, $46.60; basis, 60 per cent zinc; premium, $43.50; prime Western, $45@43; fines and slimes, $42@38; calamine, basis 40 per cent zinc, $32@28. Average settling prices: Blende, $43.48; calamine, $33.28; all zinc ores, $43.35.

Lead, high, $76.50; basis 80 per cent lead, $75; average settling price, all grades of lead, $73.78 per ton.

Shipments the week: Blende, 8,721; calamine, 118; lead, 1,554 tons. Value, all ores the week, $497,860.

The blende market was reported unchanged from last week until late this evening, when it was ascertained the higher prices above were being paid.

Receipt of more box cars and shipments by coal cars are helping move the ore stock toward the smelteries. Buying continues around 8,000 to 9,000 tons per week, a little ahead of the shipments.

Added competition advanced calamine prices, and producers set a price at $32 basis.

Iron Trade Review.

Pittsburgh—Oct. 7.

Though the outcome of the strike in the iron and steel industry was settled positively before the first week was out, even now, in the third week, the strike is receding slowly, and, indeed, it is receding at all only in districts or at plants where operations were already fairly heavy. Western Pennsylvania as a whole now shows about 85 per cent employment and 80 per cent production, or a few per cent more than a week ago. Eastern Pennsylvania and the South are running practically full. There remains a belt that is down tight, this beginning with the Wheeling district, extending north through the entire Mahoning Valley, and then running along the Lake front through Cleveland and on through Buffalo. Though Cleveland is down tight, Lorain, just a few miles west, is running practically normal. At Buffalo, Lackawanna and Donner are down tight, though Wickwire, farther to the east, is running in part.

The next chapter will open with breaks in the totally closed region, Youngstown being picked as the most likely place for a beginning. Wheeling, for years a hotbed of labor discontent, will probably be the last. Martial law has been declared in that part of the Calumet district that is in Indiana, and there will be martial law in the steel towns on the Illinois side the moment occasion arises. Thus the strikers in the closed belt are confronted with the spectacle of two-thirds of the men being out in the Calumet district without being able to do mischief to workers and the men in the Shenango Valley and western Pennsylvania generally being almost all at work, with the small minority unable to make trouble. Nevertheless, the manufacturers have no definite views as to when a break will occur, though it is considered improbable that it will be more than a few weeks. The strike is almost wholly of common labor, chiefly unlettered foreigners, to whom idleness is necessarily very irksome; and, furthermore, the matter of money is important. Those who have no savings will find it difficult to live, and those who have saved will not want to dissipate their hoardings. The strike continues to show little real management by the leaders, who apparently had nothing in mind but to start trouble which would either cause the authorities to take a hand and bring about a compromise or would develop into some sort of revolution. Public opinion is wholly against the strikers, and the efforts of the strike leaders to bring about sympathetic strikes have been altogether futile.

Employment in the iron and steel industry as a whole is now at about 60 per cent of normal, and production, in tonnage, is at 50 per cent, or a trifle more of capacity. There are practically no market transactions, as the mills that are running are already sold up. Jobbers are under heavy demand, but are selling sparingly.

Pig Iron—Production by merchant furnaces is fairly large, but, as iron foundries are not affected by the strike, the requirements exceed the supply, and pig iron is scarce. As consumers were well covered when the strike started, there is little buying. The market is firm at former quotations: Bessemer, $27.95; basic, $25.75; malleable, $26.25@$27.25; foundry, $26.75; forge, $25.75, f.o.b. Valley furnaces, freight to Pittsburgh being $1.40.

Steel—A shortage of billets and sheet bars is likely to develop through the strike affecting steel-producing units more than steel-finishing units, but prices are unlikely to be affected, as we continue to quote: Billets, $38.50; sheet bars and small billets, $42; slabs, $41; rods, $52.

Ferromanganese—A quotation of $95 c.i.f., could probably be obtained at any time on English. Domestic producers state their asking price is $110, delivered, but consumers show no interest whatever in the market.

Coke—With sharp decreases in coke production in the Connellsville region since the strike started, and with the resumption of a few furnaces closed in the early days of the strike, there is a better balance between supplies and requirements, but coke is still plentiful, and furnace might be picked up at $3.75, though some operators quote $4.25 and do not expect to sell. Some of the byproduct ovens at Youngstown are operating slow, to keep warm, and the product is being sold at low prices. Foundry coke is little affected, good grades of Connellsville bringing $6@$6.25 per net ton at ovens.

CURRENT PRICES—MATERIALS AND SUPPLIES

IRON AND STEEL

SHEETS—Quotations are in cents per pound in various cities from warehouse, also the base quotations from mill:

Blue Annealed	Large Mill Lots Pittsburgh	St. Louis	Chicago	San Francisco	New York Current	New York One Yr. Ago
No. 10	3.55	4.64	4.57	5.80	4.57	5.50
No. 12	3.60	4.69	4.62	5.75	4.62	5.55
No. 14	3.65	4.74	4.67	5.90	4.67	5.60
Black						
Nos. 18 and 20	4.15	5.24	5.42	6.75	5.30	6.30
Nos. 22 and 24	4.20	5.29	5.47	6.80	5.35	6.35
No. 26	4.25	5.34	5.52	6.95	5.40	6.40
No. 28	4.35	5.44	5.62	7.05	5.50	6.50
Galvanized						
No. 10	4.70	5.79	5.97	....	6.20	6.85
No. 12	4.80	5.89	6.07	7.30	6.25	6.95
No. 14	4.80	5.89	6.07	7.30	6.30	6.95
Nos. 18 and 20	5.10	6.19	6.37	7.60	6.60	7.25
Nos. 22 and 24	5.25	6.34	6.52	7.75	6.75	7.30
No. 26	5.40	6.49	6.67	7.90	6.90	7.45
No. 28	5.70	6.79	6.97	8.20	7.20	7.75

STEEL RAILS—The following quotations are per gross ton f. o. b. Pittsburgh and Chicago for carload or larger lots. For less than carload lots 5c. per 100 lb. is charged extra.

	Pittsburgh Current	Pittsburgh One Year Ago	Chicago Current	Chicago One Year Ago
Standard bessemer rails	$45.00	$65.00	$45.00	$65.00
Standard openhearth rails	47.00	67.00	47.00	67.00
Light rails, 8 to 10 lb.	2.58½*	3.36*	2.58½*	3.36½*
Light rails, 12 to 14 lb.	2.54*	3.09*	2.54*	3.09*
Light rails, 25 to 45 lb.	2.45*	3.00*	2.45*	3.00*

*Per 100 lbs.

TRACK SUPPLIES—The following prices are base per 100 lb. f. o. b. Pittsburgh for carload lots, together with the warehouse prices at the places named.

	Pittsburgh Current	Pittsburgh One Year Ago	Chicago	St. Louis	San Francisco
Standard railroad spikes, ⅝ in. and larger	$3.35	$3.90	$4.27	$4.44	$5.65
Track bolts	4.35	4.90	5.17	Premium	6.65
Standard section angle bars	3.00	3.25	4.22	Premium	4.60

STRUCTURAL MATERIAL—The following are the base prices f. o. b. mill, Pittsburgh, together with the quotations per 100 lb. from warehouses at the places named:

	Mill Pittsburgh	New York Current	New York 1 Yr. Ago	St. Louis	Chicago
Beams, 3 to 15 in.	$2.45	$3.47	$4.245	$3.54	$3.47
Channels, 3 to 15 in.	2.45	3.47	4.245	3.54	3.47
Angles, 3 to 6 in., ¼ in. thick	2.45	3.47	4.245	3.54	3.47
Tees, 3 in. and larger	2.45	3.52	4.245	3.54	3.47
Plates	2.66	3.67	4.495	....	3.67

STEEL SHEET PILING—The following price is base per 100 lb. f. o. b. Pittsburgh, with a comparison of a month and a year ago:

Current	One Month Ago	One Year Ago
$2.55	$2.55	$4-5

RIVETS—The following quotations are per 100 lb.:

STRUCTURAL

	Mill Pittsburgh	New York Current	New York One Year Ago	Chicago Warehouse	St. Louis Warehouse	San Francisco Warehouse	Dallas Warehouse
¾-in. and larger	$4.20	$4.72	$5.65	$4.72	$4.79	$6.05	$7.50
		CONE HEAD BOILER					
¾-in. and larger	4.30	4.82	5.75	4.82	4.89	6.15	7.20
⅝ and ⅞	4.45	4.97	5.90	4.97	5.04	6.30	7.50
½ and ⅝	4.70	5.22	6.25	5.32	5.29	6.65	7.75

Lengths shorter than 1 in. take an extra of 50c. Lengths between 1 in. and 2 in. take an extra of 25c.

WIRE ROPE—Discounts from list price on regular grades of bright and galvanized are as follows:

	New York and St. Louis
Galvanized iron rigging	+12½%
Galvanized cast steel rigging	7½%
Bright plow steel	35 %
Bright cast steel	22½%
Bright iron and iron tiller	5 %

HORSE AND MULE SHOES—Warehouse prices per 100 lb. in cities named:

	Mill Pittsburgh	Cincinnati	Chicago	St. Louis	Denver	Birmingham
Straight	$5.75	$7.50	$6.50	$6.25	$8.50	$7.35
Assorted	....	7.50	6.50	6.40	8.75	7.60

BAR IRON AND STEEL—Per pound to large buyers at mill, Pittsburgh:

Iron bars.....2.75c. Steel bars.....2.35c.

COAL BIT STEEL—Warehouse price per pound is as follows:

New York	Cincinnati	Birmingham	St. Louis	Denver	Chicago
$0.12	$0.16½	$0.18	$0.19	$0.18½	$0.14½

DRILL STEEL—Warehouse price per pound:

	New York	St. Louis	Birmingham	Denver
Solid	12c.	13c.	15c.	15c.
Hollow	18c.	14c.	....	20c.

STEEL AND IRON PIPE—The following discounts are for carload lots f. o. b. Pittsburgh, basing card of National Tube Co. for steel pipe, Cardry A. M. Byer's for iron, both dated Mar. 21, 1919.

BUTT WELD

Inches	Steel Black Per Cent.	Steel Galvanized Per Cent.	Inches	Iron Black Per Cent.	Iron Galvanized Per Cent.
¼ to 3	57½	44	¼ to 1½	39½	23½

LAP WELD

2	50½	38	1¼	24½	9½
2½ to 6	53½	41	1½	31½	17½
7 to 12	50½	37	2	32½	18½
13 and 14	41	....	2½ to 6	34½	21½
15	38½	....	7 to 12	31½	18½

BUTT WELD, EXTRA STRONG PLAIN ENDS

⅛, ¼ and ⅜	46½	29	⅛, ¼ and ⅜	28½	11½
½	51½	39	½	33½	20½
¾ to 1½	55½	43	¾ to 1½	39½	24½
2 to 3	56½	44			

LAP WELD, EXTRA STRONG PLAIN ENDS

2	48½	37	1¼	25½	10½
2½ to 4	51½	40	1½	31½	17½
4½ to 6	50½	9	2	33½	20½
7 to 8	46½	33	2½ to 4	35½	23½
9 to 12	41½	28	4½ to 6	34½	22½
			7 to 8	26½	14½
			9 to 12	21½	9½

From warehouses at the places named the following discounts hold for steel pipe:

	Black New York	Black Cleveland	Black Chicago
¾ to 3 in. butt welded	47%	43½%	57½%
3½ to 6 in. lap welded	42%	45½%	53½%
	Galvanized New York	**Galvanized Cleveland**	**Galvanized Chicago**
¾ to 3 in. butt welded	31%	34½%	44%
3½ to 6 in. lap welded	27%	30½%	41%

Malleable fittings, Class B and C, from New York stock sell at list plus 12½%, Cast iron, standard sizes, 10%.

NUTS—From warehouse at the places named, on fair-sized orders, the following amount is deducted from list:

	New York Current	New York One Year Ago	Cleveland Current	Cleveland One Year Ago	Chicago Current	Chicago One Year Ago
Hot pressed square	$1.50+	$2.50	$2.25	$1.20	$1.85	$1.05
Hot pressed hexagon	1.50+	2.50	2.25	1.00	1.85	.85
Cold punched square	1.50+	2.50	2.25	.75	1.30	1.00
Cold punched hexagon	1.50+	2.50	2.25	.75	1.30	1.00

Semifinished nuts sell at the following discounts from list price:

	Current	One Year Ago
New York	50-10%	50%
Chicago	50%	50%
Cleveland	60-10%	50%

MACHINE BOLTS—Warehouse discounts in the following cities:

	New York	Cleveland	Chicago
⅜ by 4 in. and smaller	50%	50%	50-5%
Larger and longer up to 1 in. by 30 in.	40%	40%	40-5%

WASHERS—From warehouses at the places named the following amount is deducted from list price:

For wrought-iron washers:

New York.....$1.25 Cleveland.....$3.75 Chicago.....$3.00

For cast-iron washers the base price per 100 lb. is as follows:

New York.....$6.00 Cleveland.....$3.75 Chicago.....$4.25

CONSTRUCTION MATERIALS

ROOFING MATERIALS—Prices per ton f. o. b. New York and Chicago:

	Carload Lots N. Y.	Carload Lots Chicago	Less Than Carload Lots N. Y.	Less Than Carload Lots Chicago
Tar felt (14 lb. per square of 100 sq. ft)	$70.00	$70.00	$71.00	$71.00
Tar pitch (in 400-lb. bbl.)	21.00	18.00	22.00	19.00
Asphalt pitch (in barrels)	34.00	34.00	37.50	37.50
Asphalt felt	68.00	63.00	72.50	72.50

PREPARED ROOFINGS—Standard grade rubbered surface, complete with nails and cement, costs per square as follows in New York, St. Louis, Chicago and San Francisco:

	1-Ply c. l.	1-Ply l. cl.	2-Ply c. l.	2-Ply l. cl.	3-Ply c. l.	3-Ply l. cl.
No. 1 grade	$1.50	$1.75	$1.90	$2.15	$2.30	$2.55
No. 2 grade	1.35	1.60	1.70	1.95	2.05	2.30

Asbestos asphalt-saturated felt (14 lb. per square) costs $156 per ton.

Slate-surfaced roofing (red and green) in rolls of 108 sq. ft. costs $2.25 per roll in carload lots and $2.50 for smaller quantities.

Shingles, red and green slate finish, cost $6.00 per square in carloads, $6.25 in smaller quantities, in Philadelphia.

HOLLOW TILE—

	4x12x12	8x12x12	12x12x12
St. Paul	$0.065	$0.135	$0.185
Seattle	.09	.175	.30
Los Angeles*	.082	.154	.236
New Orleans	.165	.22	.325
Cincinnati	.08	.15	.215
St. Louis	.08	.15	.....

*F. o. b. factory, 4, 8 and 10 inch.

LUMBER—Price per M in carload lots:

	8x8-In.x20 Ft. and Under			12x12-In. 20 Ft. and Under	
	P	Fir	Hemlock Spruce	P	Fir
Boston	$50.00	$49.00	$48.00 $48.00	$50.00	$50.00
Kansas City	51.00	51.25	51.25	57.00	48.50
Seattle	.....	30.00	....	.....	31.00
New Orleans	45.00	.....	....	48.00	.....
St. Paul	60.00	61.00	60.00 46.00	62.00	63.00
Atlanta	55.50	57.50	58.00 68.00	68.50	70.50

	1-In. Rough, 10 In. x 16 Ft. and Under			2-In. T. and Gr. 10 In. x 16 Ft.	
	P	Fir	Hemlock	P	Fir
Boston	$50.00	$50.00	$48.00	$50.00	$50.00
Kansas City	78.50	64.75	64.75	81.75	77.75
Seattle	.....	31.50	.....	.....	31.50
New Orleans	54.00	.....	.....	55.25	.....
St. Paul	53.00	53.00	53.00	63.00	58.50
Atlanta	80.00	85.00	.....	65.00	67.50

*2x8 costs $56. †Up to 32 ft., above that add $4. ‡Also tamarac.
Los Angeles—Base price (2x3x16 ft.), Douglas fir or hemlock, $43.
Detroit—Base price, yellow pine (8x8x20), $43.

NAILS—The following quotations are per keg from warehouse:

	Mill Pittsburgh	St. Louis	Dallas	Chicago	San Francisco
Wire	$3.25	$3.90	$5.00	$3.90	$5.25
Cut	4.25	5.85	6.40	5.50	6.65

PORTLAND CEMENT—These prices are for barrels in carload lots, without bags.

	Current	One Month Ago	One Year Ago With Bags
New York	$2.30	$2.30	$2.50
Jersey City	2.27	2.27	2.50
Boston	2.42	2.42	2.87
Chicago	2.00	2.00	2.90
Pittsburgh	2.05	2.05	2.71
Cleveland	2.32	2.32	2.15
Denver	2.67	2.67	3.07

Note—Charge for bags is generally 15c. each, 60c. per barrel.

LIME—Warehouse prices:

	Hydrated per Ton		Lump per 300-Lb. Barrel	
	Finished	Common	Finished	Common
New York	$17.50	$14.50	$2.90	$2.65
Kansas City	22.00	21.00	2.30	2.20*
Chicago	18.00	17.50	1.80*	1.10*
St. Louis	.....	18.00	.....	1.75*
Boston	22.00	18.25	3.70	3.30
Dallas	2.25*	1.25*	.....	.....
San Francisco	19.00	.....	.....	2.00*
St. Paul	23.00	20.00	1.60*	1.50*
New Orleans	.....	10.00	.....	11.00†
Atlanta	.....	1.90*	1.75*	1.75*
Denver	.....	26.25	.....	2.50‡

*200-lb. barrels. †Per 180-lb. bbl. ‡Per ton.
Note—Refund of 10c. per barrel.

LINSEED OIL—These prices are per gallon:

	New York		Cleveland		Chicago	
	Current	One Year Ago	Current	One Year Ago	Current	One Year Ago
Raw per barrel (5 bbl. lots)	$2.15	$1.90	$2.50	$2.10	$2.37	$2.05
5-gal. cans	2.28	2.00	2.75	2.25	2.57	2.25

WHITE AND RED LEADS—in 500-lb. lots sell as follows in cents per pound:

	Red				White	
	Current		1 Year Ago		Current	1 Yr. Ago
	Dry	In Oil	Dry	In Oil	Dry and In Oil	Dry and In Oil
100-lb. keg	$13.00	$14.50	$14.00	$14.50	$13.00	$14.00
25- and 50-lb. kegs	13.25	14.75	14.25	14.75	13.25	14.20
12½-lb. keg	13.50	15.00	14.50	15.00	13.50	14.50
5-lb cans	15.00	16.50	....	....	15.00	16.00
1-lb. cans	16.00	17.50	....	....	16.00	17.00

MINING AND MILLING SUPPLIES

HOSE—

	Fire
Underwriters' 2½-in.	50-Ft. Lengths 75c. per ft.
Common, 2½-in.	40%

	Air		
	First Grade	Second Grade	Third Grade
¾-in. per ft.	$0.50	$0.33	$0.22

Steam—Discounts from List

First grade.....30% Second grade.....40% Third grade.....45%

LEATHER BELTING—Present discounts from list in the following cities are as follows.

	Medium Grade	Heavy Grade
New York	45%	35%
St. Louis	40%	35%
Chicago	45%	40%
Birmingham	35%	30%
Denver	35-5%	30%
Cincinnati	30-5-2½%	40-2½%

RAWHIDE LACING—30% off for cut; 62c. per sq. ft. for side lacing.

MANILA ROPE—For rope smaller than ⅝ in. the price is ½ to 2c. extra, while for quantities amounting to less than 600 ft. there is an extra charge of 1c. The number of feet per pound for the various sizes is as follows: ⅝-in., 8 ft., ¾-in., 6; ⅞-in., 4½; 1-in., 3½; 1⅛-in., 2 ft. 10 in.; 1¼-in., 2 ft. 4 in. Following is price per pound for ⅝-in. and larger, in 1200-ft. coils.

Boston	$0.25	Denver	$0.27½
New York	.27	Kansas City	.27
Cincinnati	.29	New Orleans	.25½
Chicago	.26½	Seattle	.25
St. Paul	.28	St. Louis	.26½
San Francisco	.24	Atlanta	.29½

PACKING—Prices per pound:

Rubber and duck for low-pressure steam	$0.90
Asbestos for high-pressure steam	1.50
Duck and rubber for piston packing	1.00
Flax, regular	1.20
Flax, waterproofed	1.60
Compressed asbestos sheet	.90
Wire insertion asbestos sheet	1.10
Rubber sheet	.50
Rubber sheet, wire insertion	.70
Rubber sheet, duck insertion	.50
Rubber sheet, cloth insertion	.30
Asbestos packing, twisted or braided and graphited, for valve stems and stuffing boxes	1.20
Asbestos wick, ½- and 1-lb. balls	..85

REFRACTORIES—Following prices are f. o. b. works:

Chrome brick	net ton	$90-100	at Chester, Penn.
Chrome cement	net ton	45-50	at Chester, Penn.
Clay brick, 1st quality fire clay	per M	35-45	at Clearfield, Penn.
Clay brick, 2d quality	per M	30-35	at Clearfield, Penn.
Magnesite, dead burned	net ton	32.50	at Chester, Penn.
Magnesite brick, 9x4½x2½ in.	net ton	80-90	at Chester, Penn.
Silica brick	per M	41-45	at Mt. Union, Penn.

Standard size fire brick, 9x4½x2½ in. The second quality is $4 to $5 cheaper per 1000.
St. Louis—Fire clay, $30 to $40.
Birmingham—Fire clay, $41-$44; silica, $46.50-$54.50; magnesite, $80-$85; chrome, $80 to $90.
Chicago—Second quality, $25 per ton.
Denver—Silica is $35 per 1000.

RAILWAY TIES—For fair size orders, the following prices per tie hold:

	Material	7 In. x 9 In. by 8 Ft. 6 In.	6 In. x 8 In. by 8 Ft.
Chicago	Plain	$1.48	$1.33
San Francisco	Douglas Fir—Green	1.42	1.00
San Francisco	Douglas Fir—Creosoted	2.12	2.00

Prices per tie at Missouri mills; St. Louis prices about 25c. higher:

Untreated A Grade White Oak 6x8x8		Untreated A Grade Red Oak 6x8x8	
No. 1	$0.70	No. 1	$0.55
No. 2	.80	No. 2	.65
No. 3	.90	No. 3	.75
No. 4	.98		
7x9x8 white oak	1.05		
7x9x8 red oak, No. 4	.80	No. 5	.87

FLOTATION OILS—Prices of oils for flotation, in cents per gallon, in barrels

	New York	Chicago In Bbl.	Chicago Carloads	Denver
Pure steam-distilled pine oil, sp. gr. 0.925-0.94	$1.05	$1.05	$1.00	$ .85
Pure destructively distilled pine oil	.96	.95	.90	.85
Pine tar oil, sp. gr. 1.02-1.035	.45	.36	.34	.55-.60
Crude turpentine	.85	.68	1.68	.30
*Hardwood creosote, sp. gr. 0.96-0.99	.30	....	....	.25-.30

*F. o. b. Cadillac, Mich.

COTTON WASTE—The following prices are in cents per pound:

	New York Current	New York One Year Ago	Cleveland	Chicago
White	$13.00	$11.00	$14.00	$11.00 to $14.00
Colored mixed	9.00 to 12.00	8.50-12.00	11.00	9.50 to 12.00

WIPING CLOTHS—Jobbers' price per 1000 is as follows:

	13¼x13¼	13¼x20½
Cleveland	$52.00	$58.00
Chicago	41.00	43.50

EXPLOSIVES—Price per pound of dynamite in small lots and price per 25 lb. keg for black powder.

	Low Freezing 20%	Gelatin 40%	Gelatin 60%	Gelatin 80%	Black Powder
New York	.....	$0.27½	$0.30	.....	$2.40
Boston	$0.22¼	.24¼	.26¾	$0.31	2.20
Cincinnati	.19¼	.21¼	.23¼	.....	2.25
Kansas City	.19	.23¾	.26¼	.30	2.45
New Orleans	.....	.22¾	.24¾	.....	.....
Seattle	.14¼	.18½	.25½	.31½	1.90
Chicago	.18¾	.21¾	.25½	.29¾	2.15
St. Paul	.19	.23¾	.26¼	.....	2.45
St. Louis	.19	.23¼	.25¾	.30	2.40
Denver	.17¾	.22	.24½	.28¾	2.25
Dallas	.189	.225	.228	.342	.....

CHEMICALS

SODIUM CYANIDE—New York price is 31c. per lb.; Denver, 37c.; Chicago 31½c.; St. Louis, 31c.

SODIUM SULPHIDE—In New York the price per pound is 5c. for concentrated, 3c. for crystals. The St. Louis price is 5c. for concentrated. The Denver price is 7½c. for crystals. The Chicago price is 5c. for concentrated, 3c. for crystals. Concentrated comes in 500-lb. drums, the crystals in 440-lb. bbl.

ZINC DUST—For 350 mesh the New York price is 10c. per lb.; Chicago, 13c., Denver, 22c., St. Louis, 15c.

ALUMINUM DUST—Chicago price is 1.10 per lb.

MINERS' LAMP CARBIDE—Prices net f. o. b. cars at warehouse points.

	Union 100-Lb. Drums Per Ton	Cameo 100-Lb. Drums Per Ton	Union 25-Lb. Drums Per Drum
East of the Mississippi, North of Chattanooga	$106.00	$101.00	$1.52
Southeastern portion U. S. A.	115.50	110.50	1.63
Texas (except El Paso)	124.00	119.00	1.74
El Paso, Texas	126.00	121.00	1.77
Denver, Col.	124.00	119.00	1.74
West Coast	129.00	124.00	1.81